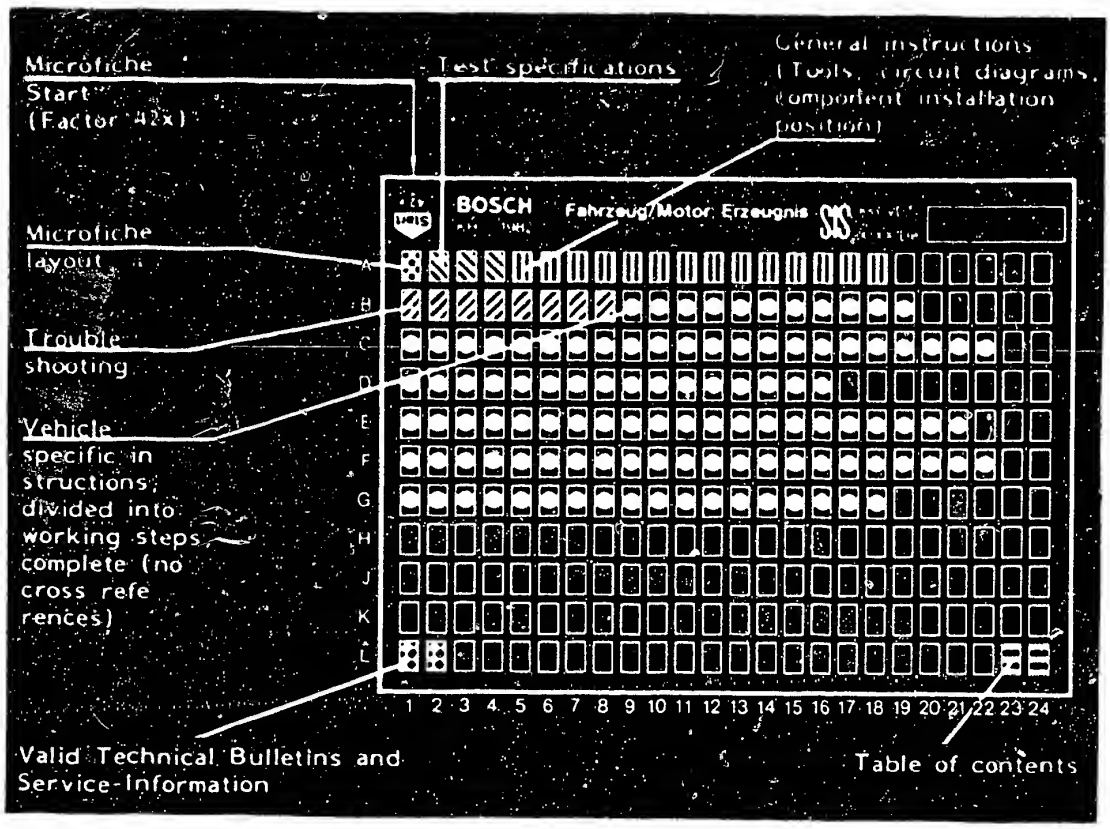
Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E16	Product/assembly/test step Vehicle/engine	

Coordinate

3. Limits of section

Beginning	Mid-section	End	One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

1. Test specifications

C9

1.1 Idle speed

700-800 min^{-1}

D1

1.2 Nozzle-opening pressure

135 + 8 bar

E1

1.3 Pre-heating times

°C	Preheating time (sec.) approx.
0	6
+20	4
+40	2

E10

1.4 Compression loss

max. permissible 25%

G7

1.5 Injection timing

Engine position 24° BTDC on cyl. 1

G12

1.6 Testing the charge-air pressure

Nominal value 0.7 - 0.8 bar

C20

1.7 Checking the vacuum system

Nominal value 400 mbar vacuum

D9

1.8 Testing the delivery pressure

Measuring point between fuel pump and main fuel filter.

Delivery pressure at idle:	0.6-0.8 bar
at 3000 min.:	min.0.8 bar

D14

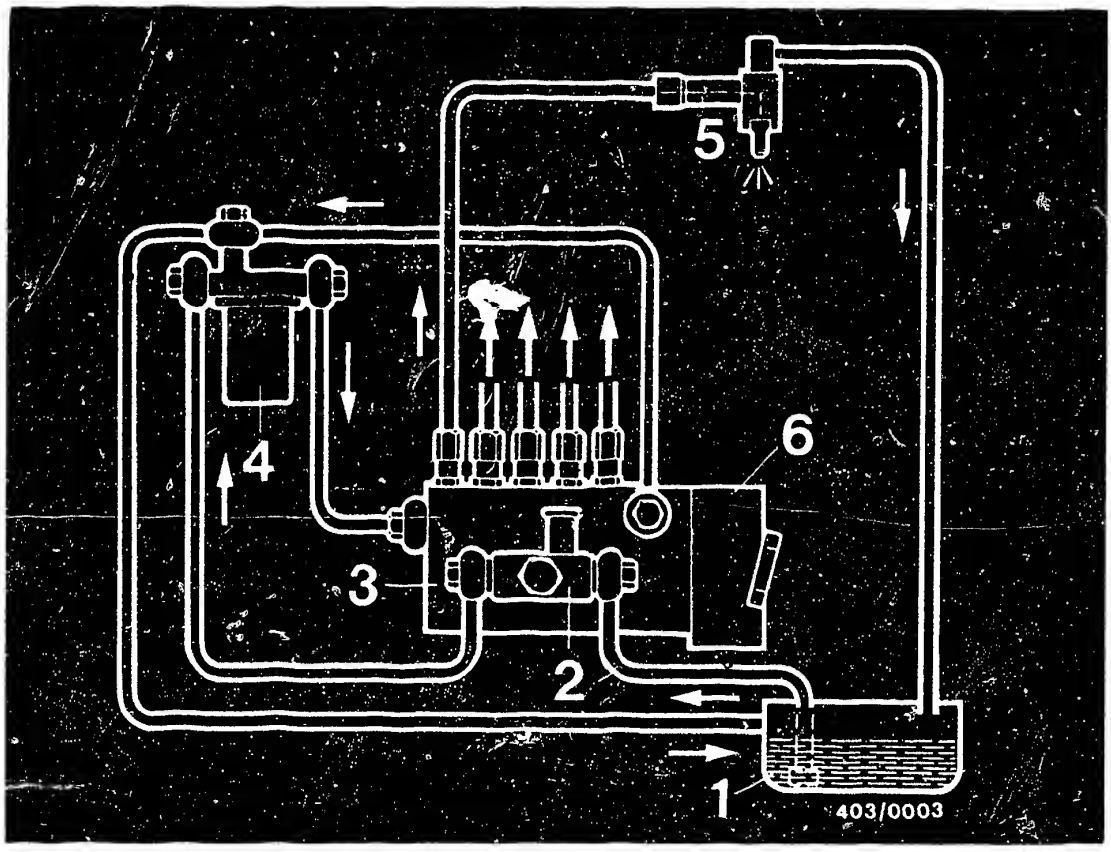
1.8.1 Testing the maximum delivery pressure

Measuring point between fuel pump and main fuel filter.

Max. delivery pressure at idle:	min. 1.1 bar
at 3000 min.:	min. 1.3 bar

1.9 Tightening torques

	Nm	kgfm
Camshaft gear fastening screw	80	(8.0)
Nozzle-holder assembly	70-80	(7-8)
Nuts for oil filter cover	20-25	(2-2.5)
Delivery-valve holder	40-50	(4-5)
Fuel-injection tubing	25	(2.5)

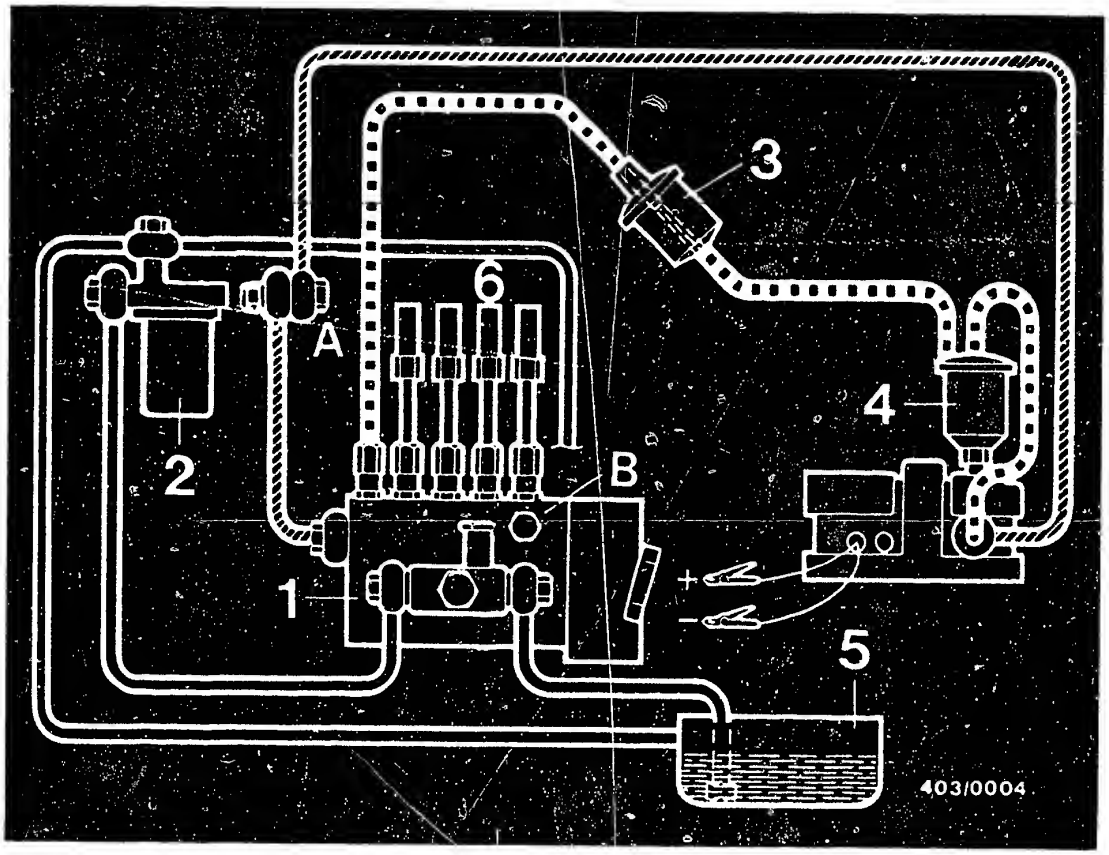


1 = Fuel tank
2 = Supply pump
3 = In-line injection pump
4 = Fuel filter
5 = Injection nozzle
6 = Governor

2. Connection diagrams of lines

2.1 Diagram of fuel lines

The fuel lines are connected as shown in the above diagram.
The fuel flows in the direction of the arrows.



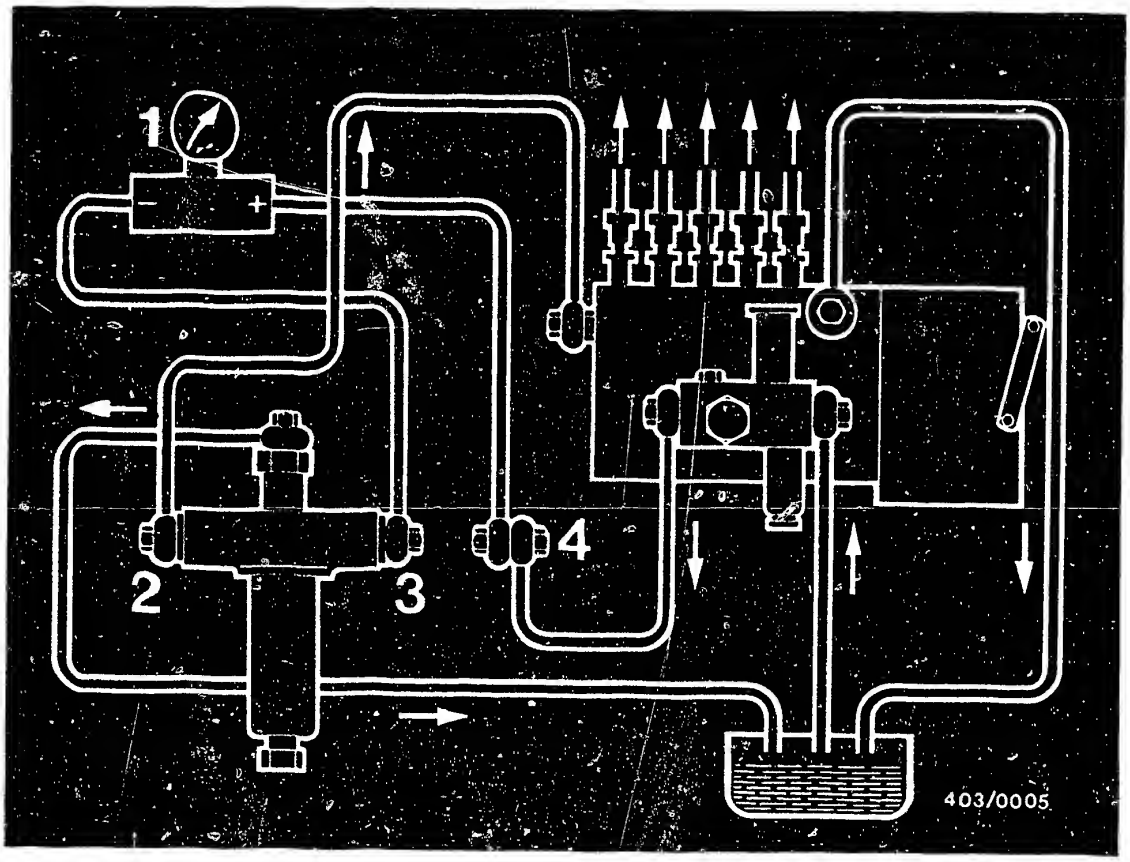
Return line
High pressure approx. 34 - 2 bar

1 = Injection pump
2 = Fuel filter
3 = Sight glass
4 = Start-of-delivery setting device
5 = Fuel tank
6 = Pressure-relief valves

A = Inlet-union screw, fuel inlet of start-of-delivery setting device
B = Close fuel return line with screw plug.

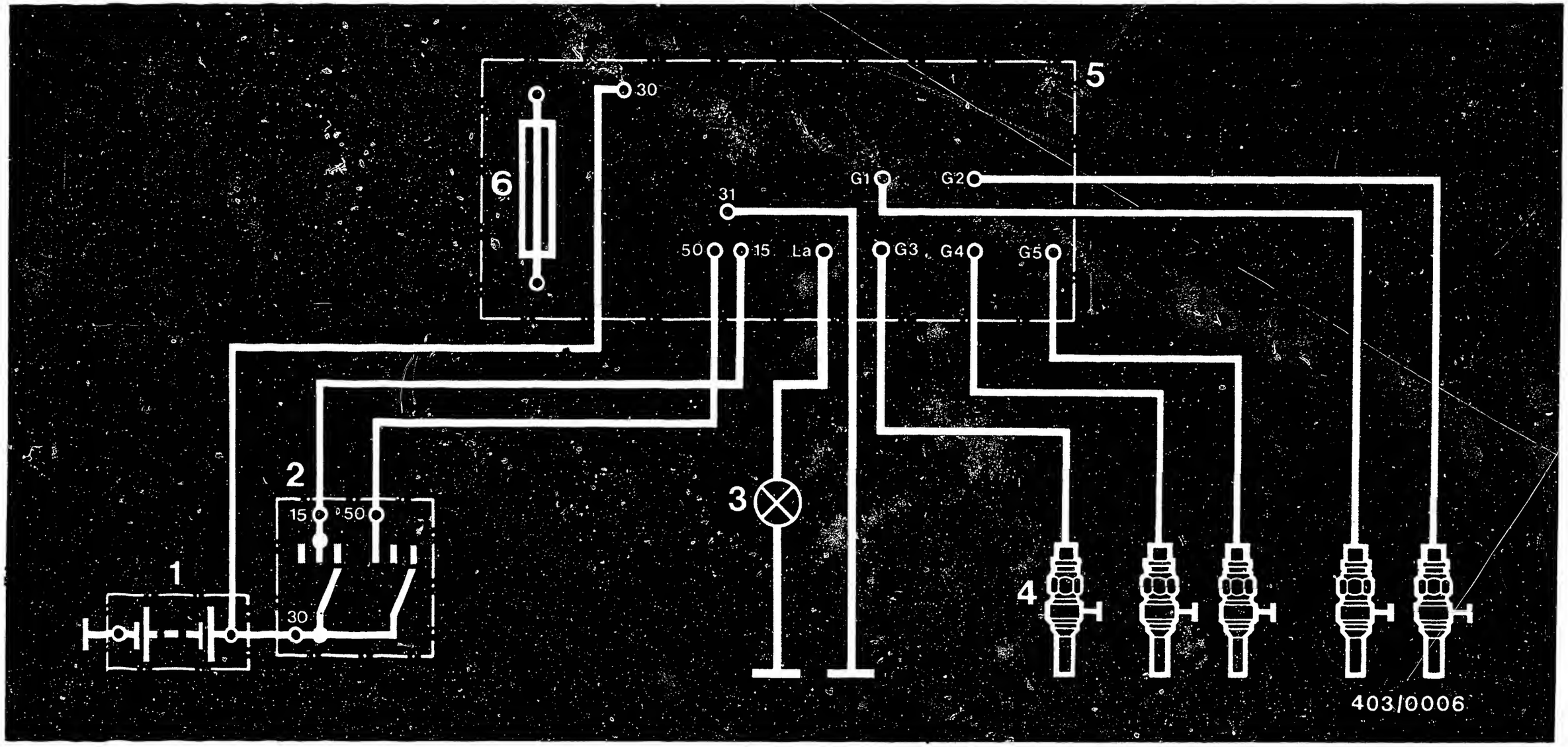
2.2 Connection diagram for setting the start of pump delivery

High-pressure overflow method



1 = Differential-pressure gauge
2 = Filter outlet (use inlet union and extra-long inlet-union screw 2 443 456 020).
3 = Filter inlet (use inlet union and existing inlet-union screw on fuel filter)
4 = Double inlet-union screw with closing nut

2.3 Diagram of fuel lines for testing the delivery pressure



3. Auxiliary starting system

1 = Battery

2 = Glow-plug and starter switch

3 = Start repeater lamp

4 = Sheathed-element glow plug

5 = Glow-duration unit

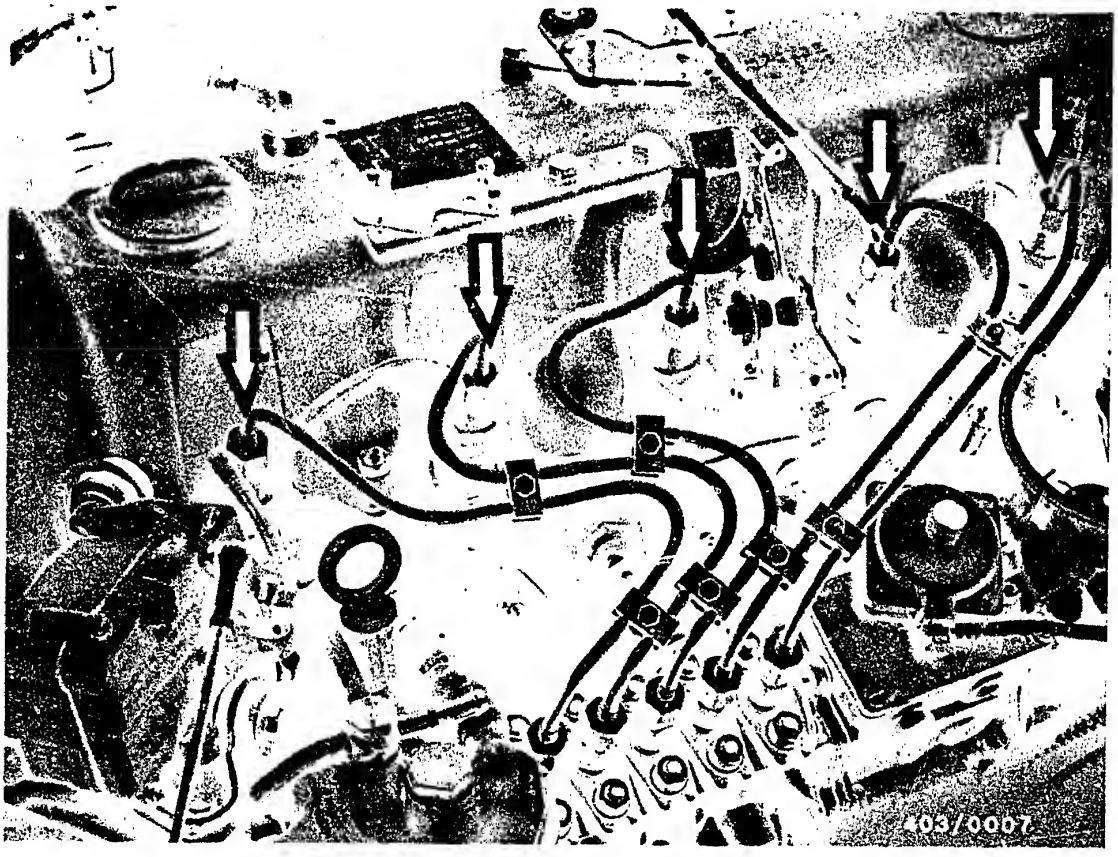
6 = Fuse strip (80 A)

4. Test equipment and tools

Designation	Part No.	Use
Nozzle tester	EFEP 60H 0 681 200 502	Testing the injection nozzles
Compression tester	Commercially available	Testing the engine compression
Compression-loss tester	EFAW 210A 0 681 001 901	Testing the engine compression loss
Differential-pressure gauge	Commercially available e.g. Henni Co. NG 160/311-911/ 1.0 + 4 bar Henni u. Co. GmbH Nauheimerstr.72-80 7000 Stuttgart 50	Testing the filter
Smoke tester	0 681 169 039 0 681 169 038	Smoke test
Start-of-delivery setting device	KDEP-P200	Injection timing
Connecting parts for KDEP-P200	KDEP-P200/50	Injection timing
Box wrench	KDEP 1115	Loosening the fuel-injection tubing

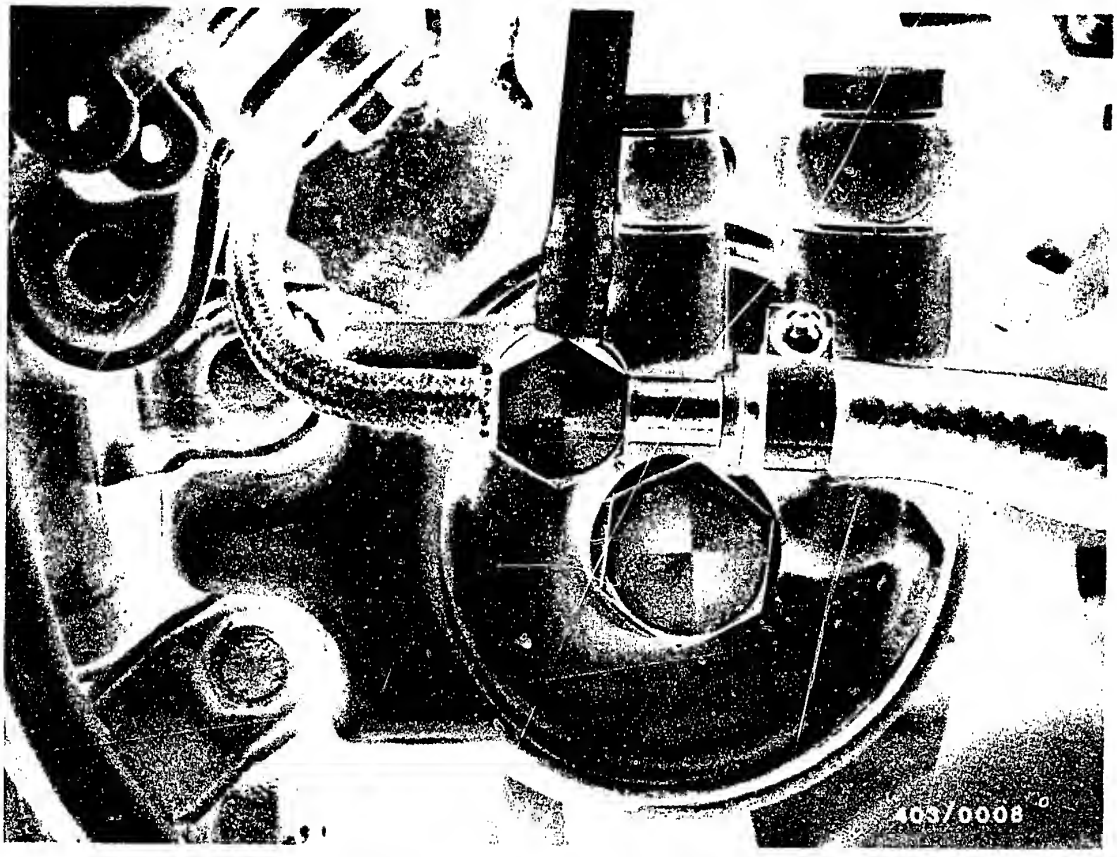
Test equipment and tools (continued)

Designation	Part No.	Use
Motortester with adapter cable	MOT 001.04 1 684 463 094	Measuring the engine speed
Adjusting sleeve	Mercedes-Benz Part No. 1 800 720 393	Adjusting the engine control
Pickup	1 687 224 556	Functional test of timing device
Contact-triggered stroboscope	0 681 101 104	Functional test of timing device
Needle tester	1 688 200 153	Testing the longitudinal bore
Nozzle-cleaning tool	KDEP 2900	For cleaning pintle and hole-type nozzles
"Mityvac" hand vacuum pump	Fa. Korinth Ludwig-Kloos-Straße 21 6450 Hanau 7 (Steinheim)	Leak test of key-operated starting system
Puller	KDEP 1131	For removing the driver



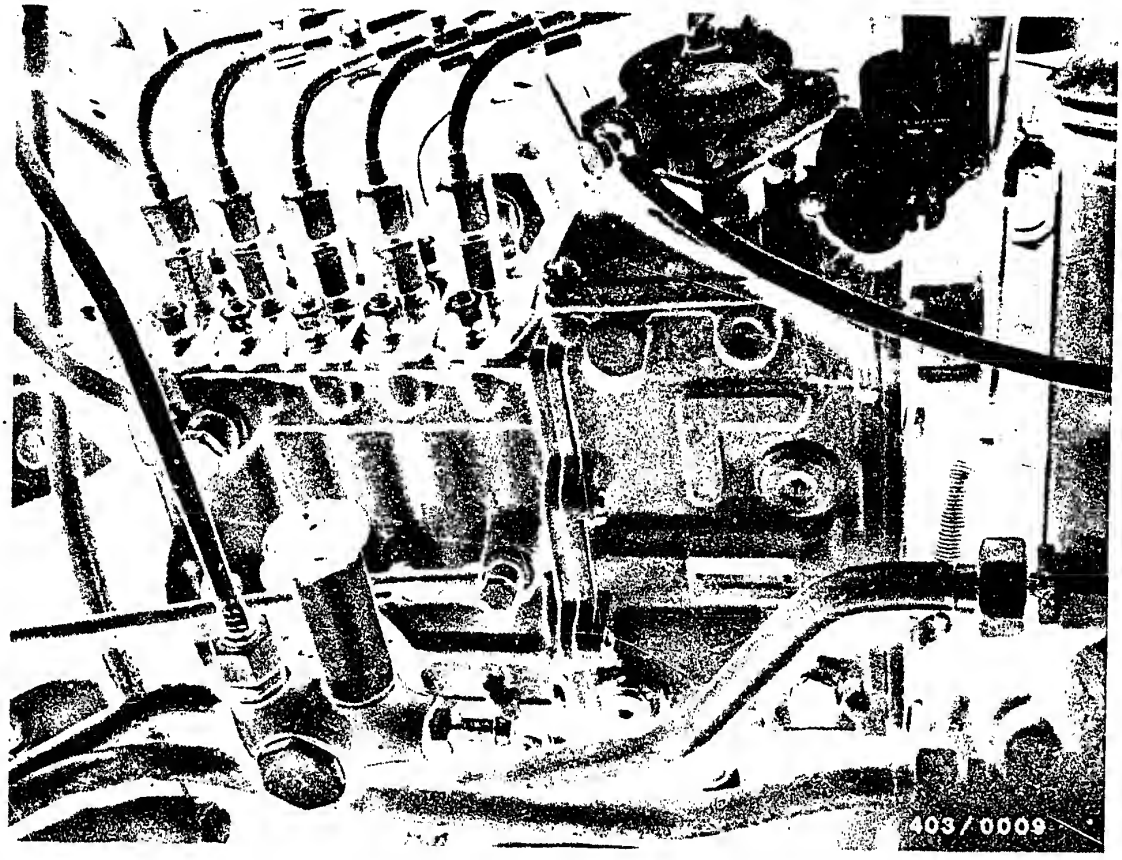
5. Installation position of components

5.1 Installation position of injection nozzles



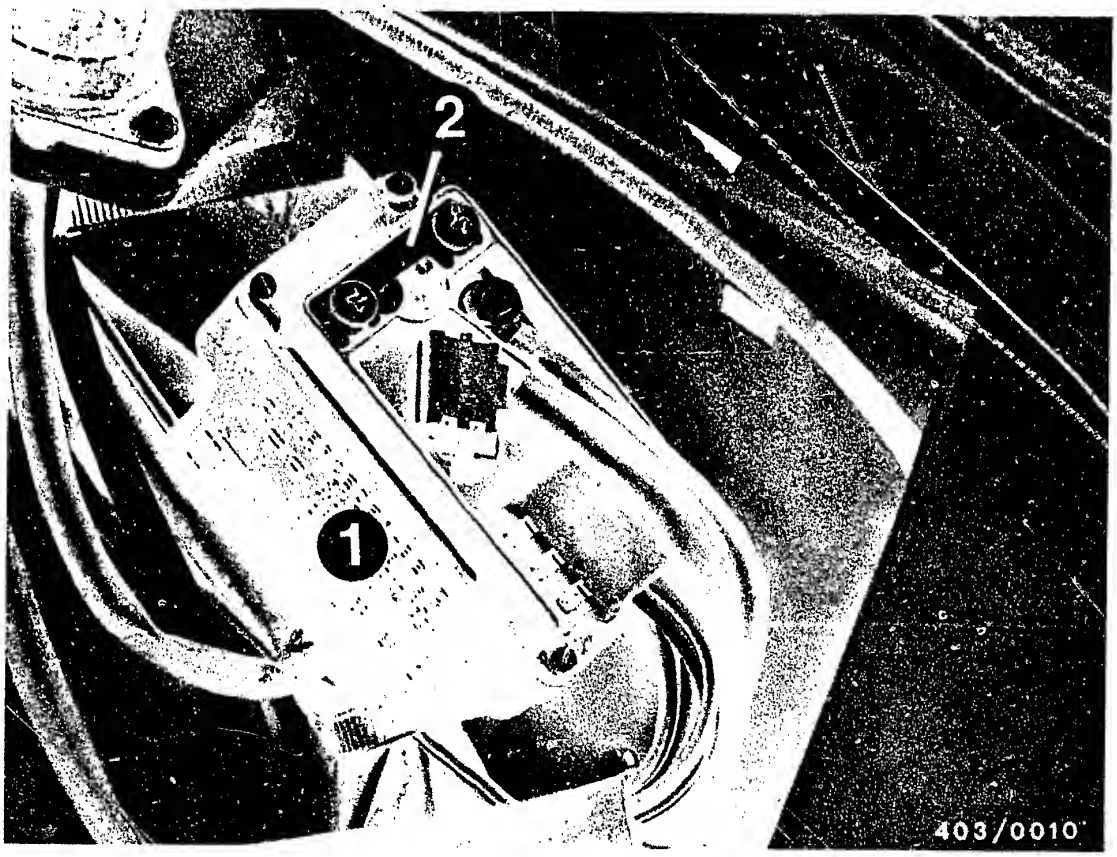
5.2 Installation position of fuel filter

On the engine block on the left-hand side as viewed in the forward direction of travel.



5.3 Installation position of injection pump

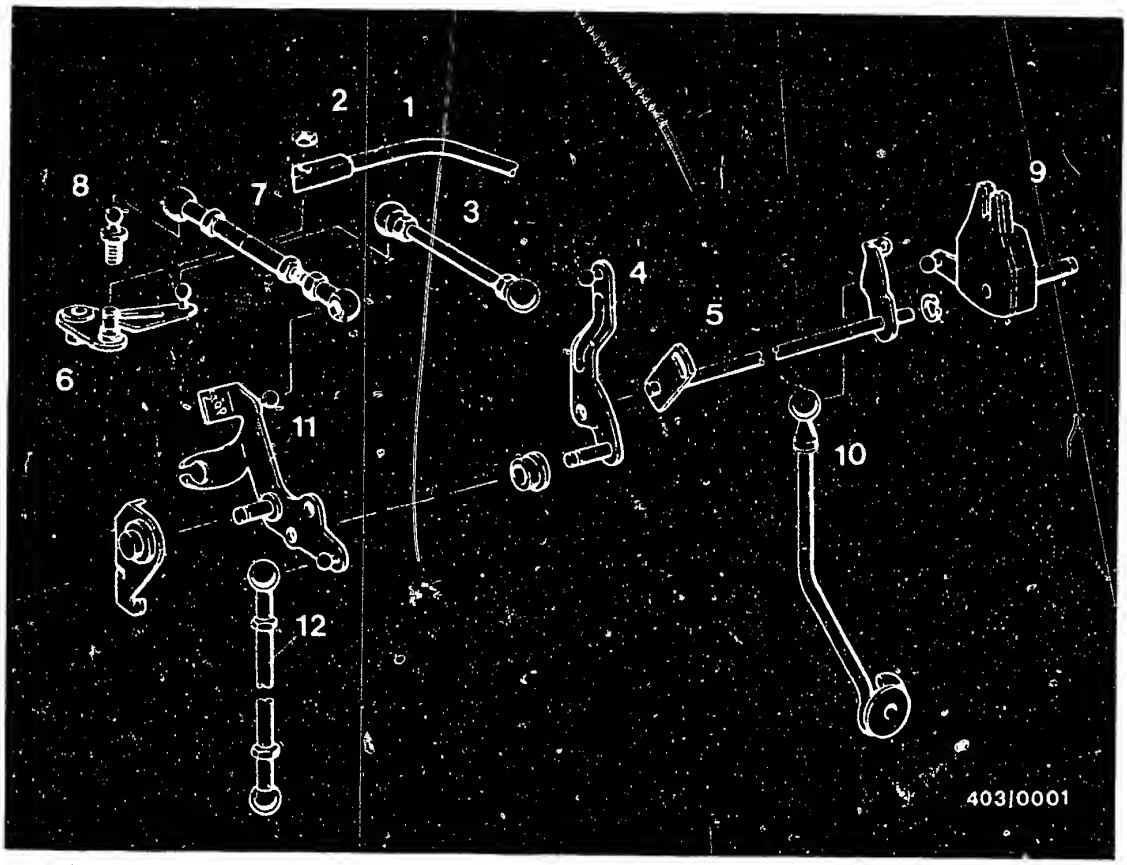
On the engine block on the left-hand side as viewed in the forward direction of travel.



5.4 Installation position of glow-duration unit

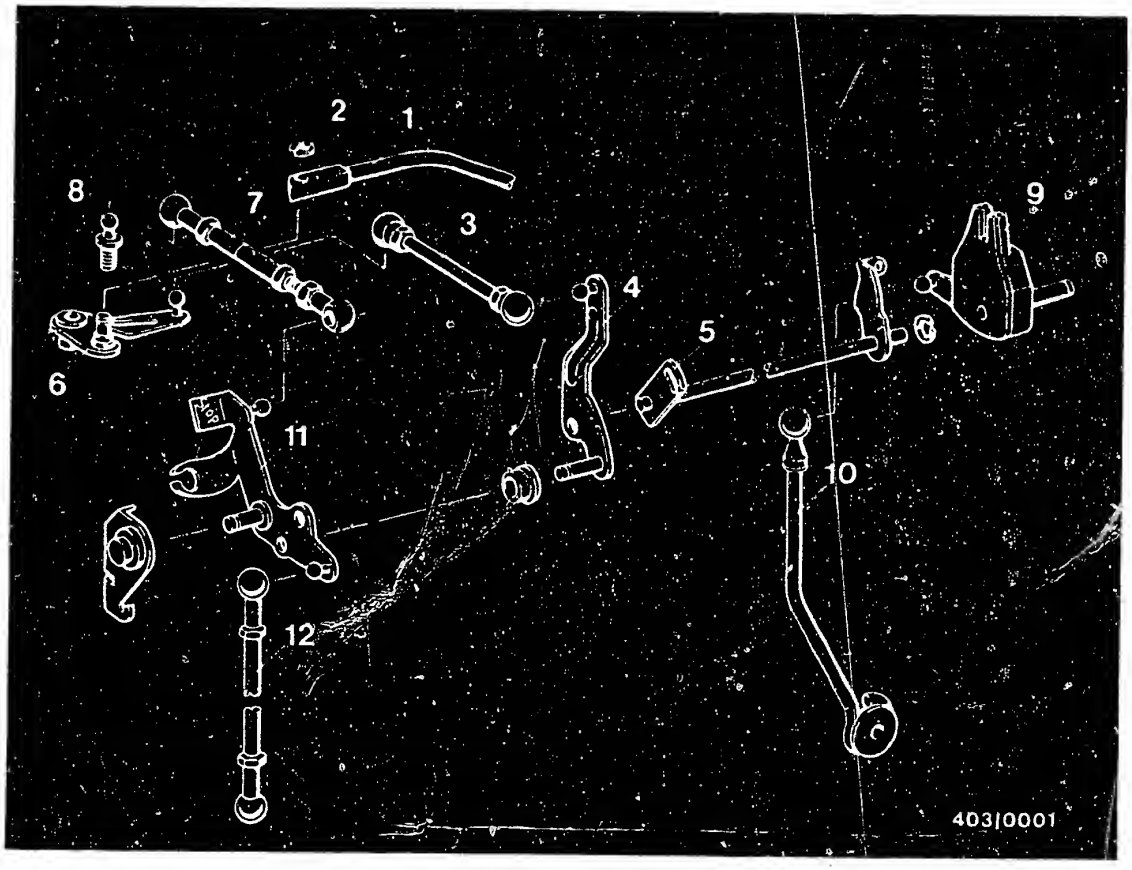
1 = Glow-duration unit
2 = Fuse strip (80 A)

In the engine compartment at the front on the left-hand side.



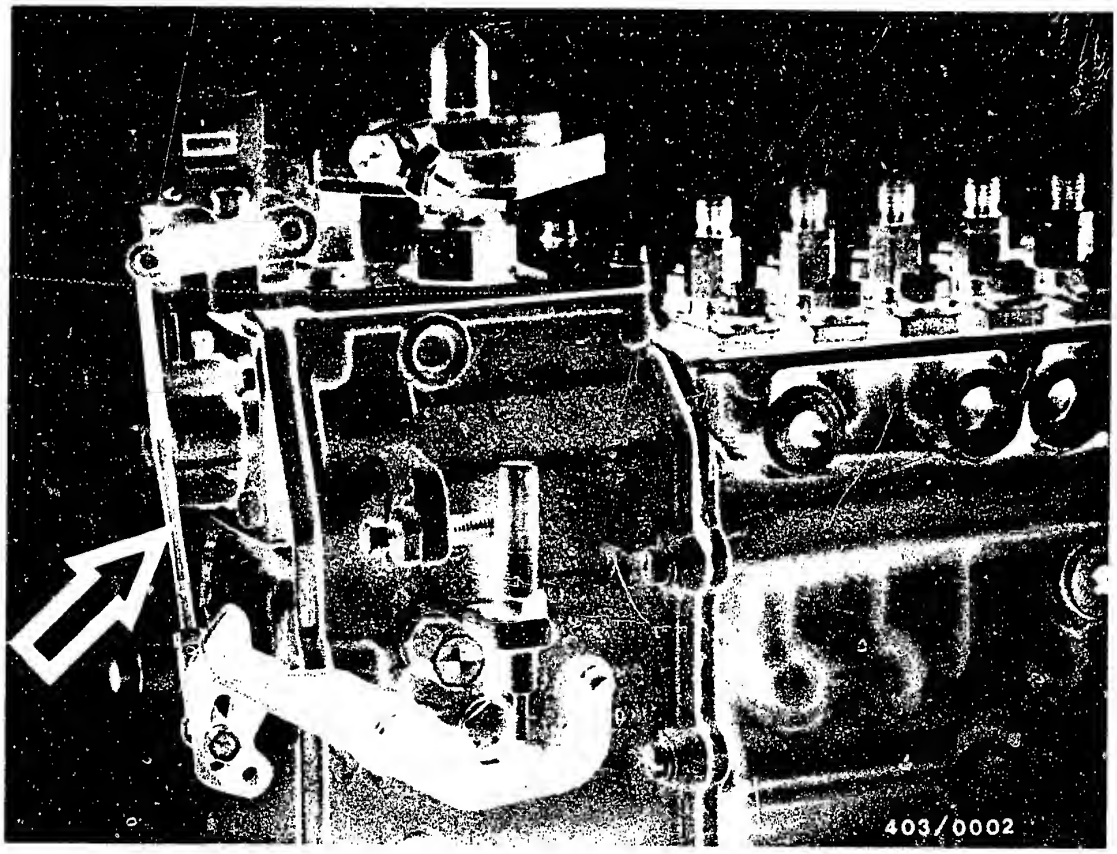
5.5 Engine control

1 = Control-pressure rod
2 = Locking washer
3 = Connecting rod
4 = Reverse-transfer lever
5 = Longitudinal control shaft
6 = Regulating lever
7 = Idle-travel rod
8 = Screw-in ball head
9 = Regulating lever with damper
10 = Pressure rod
11 = Bell crank
12 = Pressure rod



Setting the engine control (settings)

Idle-travel rod	(7)	154 mm
Connecting rod	(3)	140 mm
Pressure rod	(12)	190 mm
Pressure rod	(10)	200 mm



Connecting linkage (arrow)	122 mm

6. Trouble-shooting

Customer complaint (symptom)

1. Engine fails to start or starts only with great difficulty when warm.
2. Engine fails to start or starts only with great difficulty when cold
3. Engine hunts when idling
4. Erratic idling when engine is warm
5. Engine misses during vehicle operation (part load)
6. Unsatisfactory performance
7. Engine bucks at full load

1	2	3	4	5	6	7	Cause	Coordinates
●	●			●			Tank empty; tank vent clogged	B 9
●	●	●	●	●	●		Injection sequence does not correspond to firing sequence	B 10
●	●		●	●		●	Air in fuel system	B 12
	●			●			Heavy paraffin deposits in filter	B 15
●	●		●	●	●	●	Connections loose; lines leaky or broken	B 17
●	●			●	●		Supply lines clogged	B 19
●	●		●	●			Fuel-injection tubing clogged or constricted	B 19
					●	●	Engine air filter clogged	C 1
		●	●				Idle speed incorrect; adjust engine control	C 9
							Check vacuum system	C 20
●	●		●	●	●	●	Injection nozzle defective	D 1
●	●			●	●	●	Fuel filter clogged	D 9

Customer complaint (symptom) (continued)

1. Engine fails to start or starts only with great difficulty when warm.	2. Engine fails to start or starts only with great difficulty when cold	3. Engine hunts when idling	4. Erratic idling when engine is warm	5. Engine misses during vehicle operation (part load)	6. Unsatisfactory performance	7. Engine bucks at full load	Cause	Coordinates
●	●			●	●	●	Test the fuel delivery pressure	D 9
	●		●				Valves leaking	D 9
●	●			●	●		Overflow valve clogged	D 9
	●						Pre-heating system defective	E 1
					●		Compression of engine poor or uneven	E 10
●	●		●	●	●	●	Start of pump delivery incorrect	G 7
					●	●	Timing device defective	G 1
					●		Maximum engine speed incorrectly adjusted	F 1
●	●	●	●	●	●	●	Injection pump (governor) defective or out of adjustment	F 1
					●	●	Test the exhaust turbo-supercharger for leaks and charge-air pressure	G 12
					●		Check connecting hose for leaks	G 15
				●			Test pressure switch and change-over valve	G 16

Customer complaint (symptom) (continued)

8. Fuel consumption too high
9. Engine will not switch off or only switches off with a delay
10. Engine runs rough, black smoke in full-load range; lack of power
11. Fog-like smoke in full-load range (white)
12. Incorrect engine speeds
13. Engine will not rev up when cold
14. Injection pump overheats

8	9	10	11	12	13	14	Cause	Coordinates
							Tank empty; tank vent clogged	B 9
		●	●		●		Injection sequence does not correspond to firing sequence	B 10
							Air in fuel system	B 12
						●	Heavy paraffin deposits in filter	B 15
●		●	●		●		Connections loose; lines leaky or broken	B 17
						●	Supply lines clogged	B 19
		●					Fuel-injection tubing clogged or constricted	B 19
●		●					Engine air filter clogged	C 1
				●			Idle speed incorrect; adjust engine control	C 9
	●						Check vacuum system	C 20
●		●	●		●		Injection nozzle defective	D 1
							Fuel filter clogged	D 9

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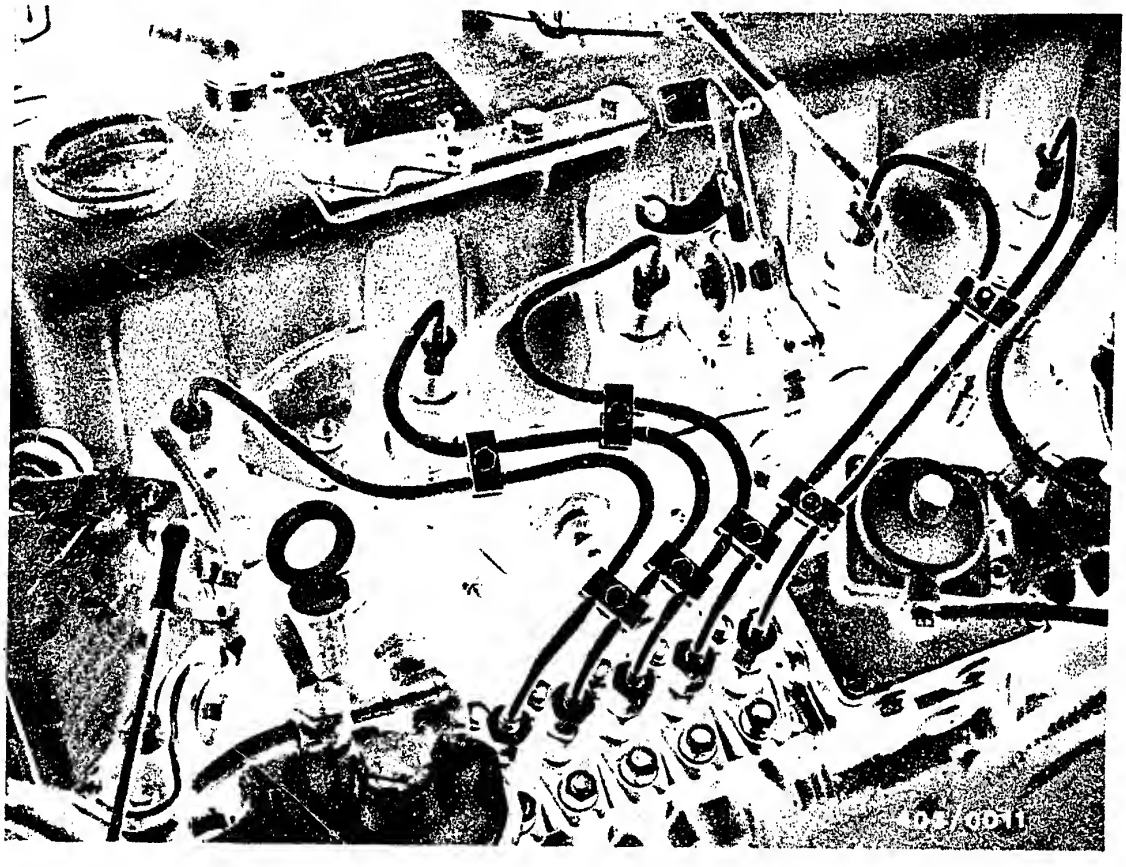
		●	●				Compression of engine poor or uneven	E 10
●		●	●		●		Start of pump delivery incorrect	G 7
●		●	●		●		Timing device defective	G 1
				●			Maximum engine speed incorrectly adjusted	F 1
●	●	●	●	●	●	●	Injection pump (governor) defective or out of adjustment	F 1
							Test the exhaust turbo-supercharger for leaks and charge-air pressure	G 12
							Check connecting hose for leaks	G 15
							Test pressure switch and change-over valve	G 16

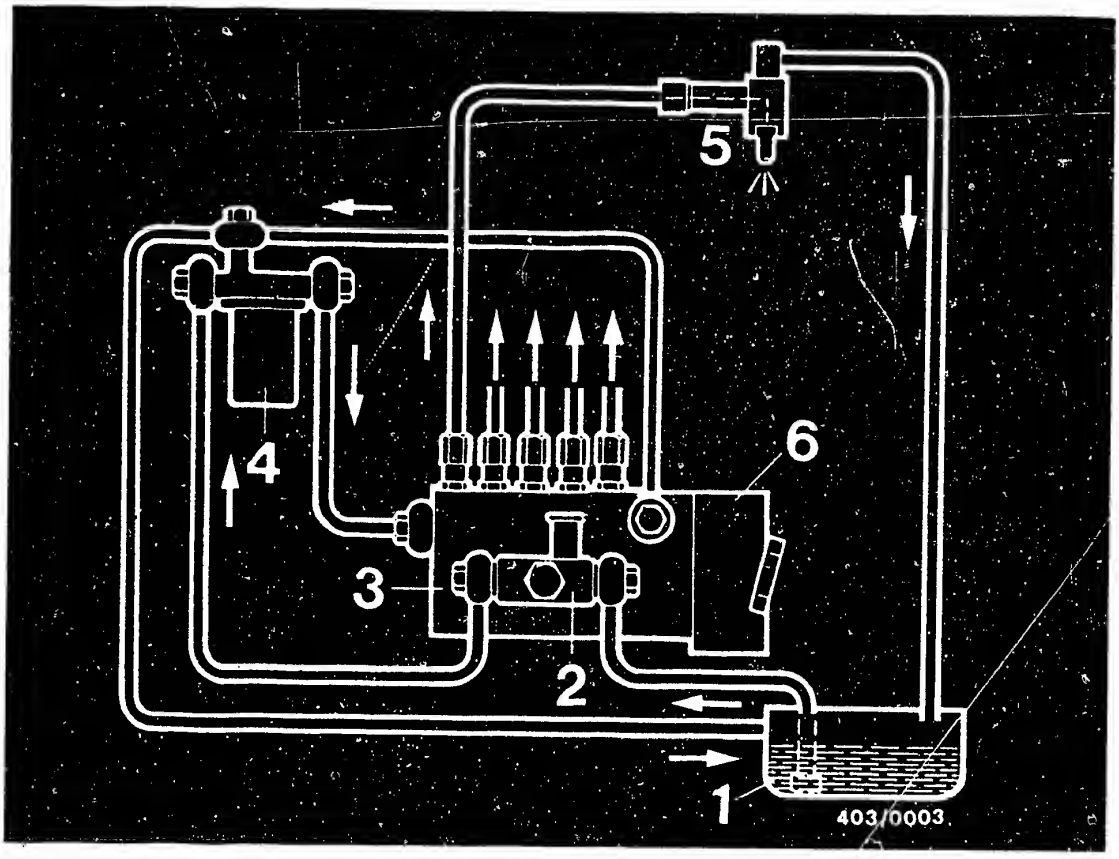
7. Checking the tank vent

Open filler cap.
If the fault disappears after opening the filler cap, the tank vent is defective.
Check the tank vent cup seal on the right-hand side on the floor frame in front of the rear-axle suspension to see if it is clogged.



8. Checking the routing of fuel-injection tubing

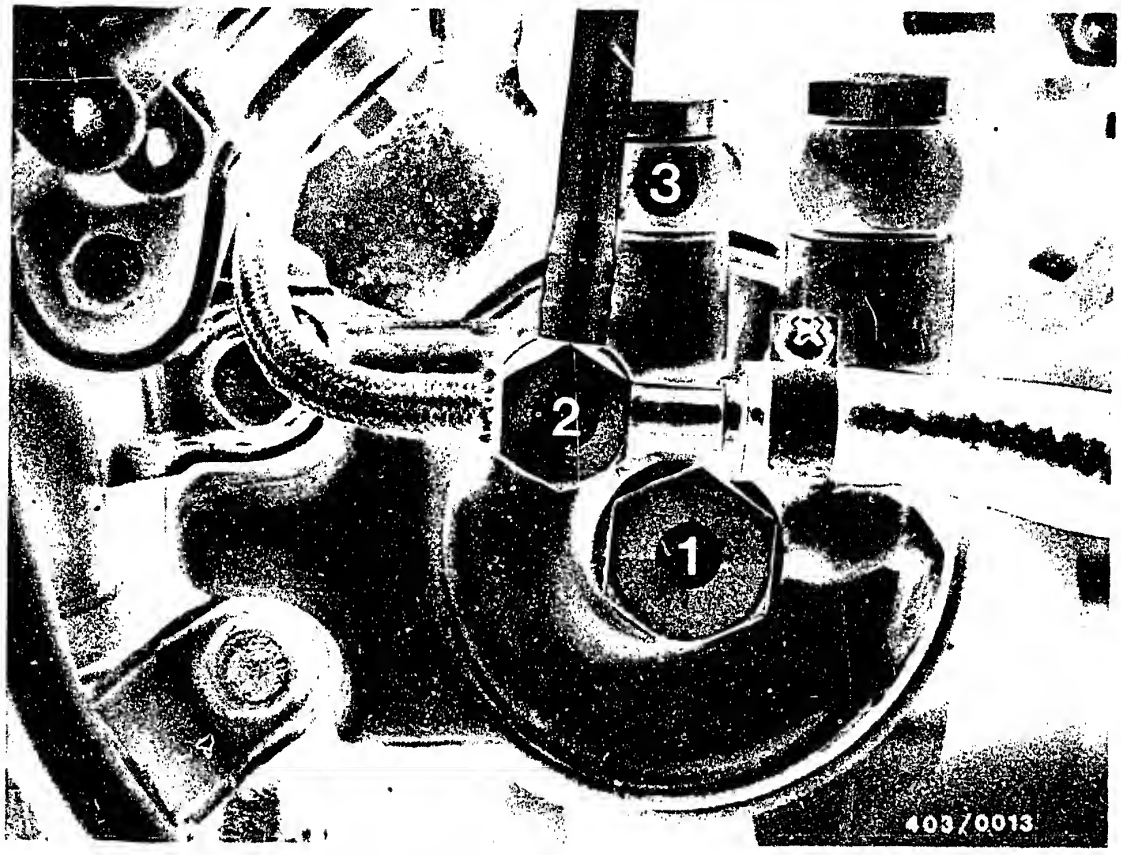
The individual fuel-injection lines are held together by clamps so that it is impossible for the outlets to be mixed up.
If, however, there is any doubt, check the routing of the lines as shown in the above picture.



1 = Fuel tank
2 = Supply pump
3 = In-line injection pump
4 = Fuel filter
5 = Injection nozzles
6 = Governor

9. Diagram of fuel lines

The fuel lines are connected as shown in the above diagram.
The fuel flows in the direction of the arrows.

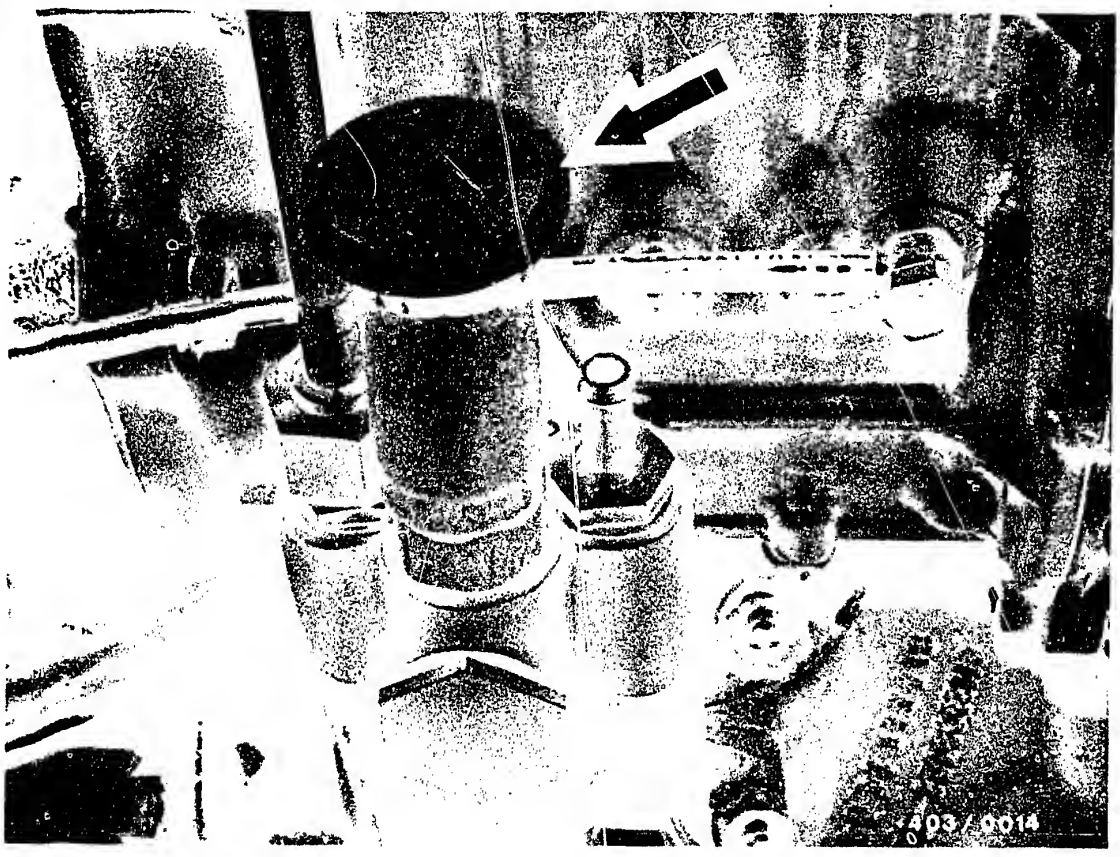


1 = Screw plug
2 = Central screw plug
3 = Inlet-union screw

10. Bleeding the injection system

Fill up fuel filter and fuel-injection pump with diesel fuel.

Loosen inlet-union screw on fuel filter.

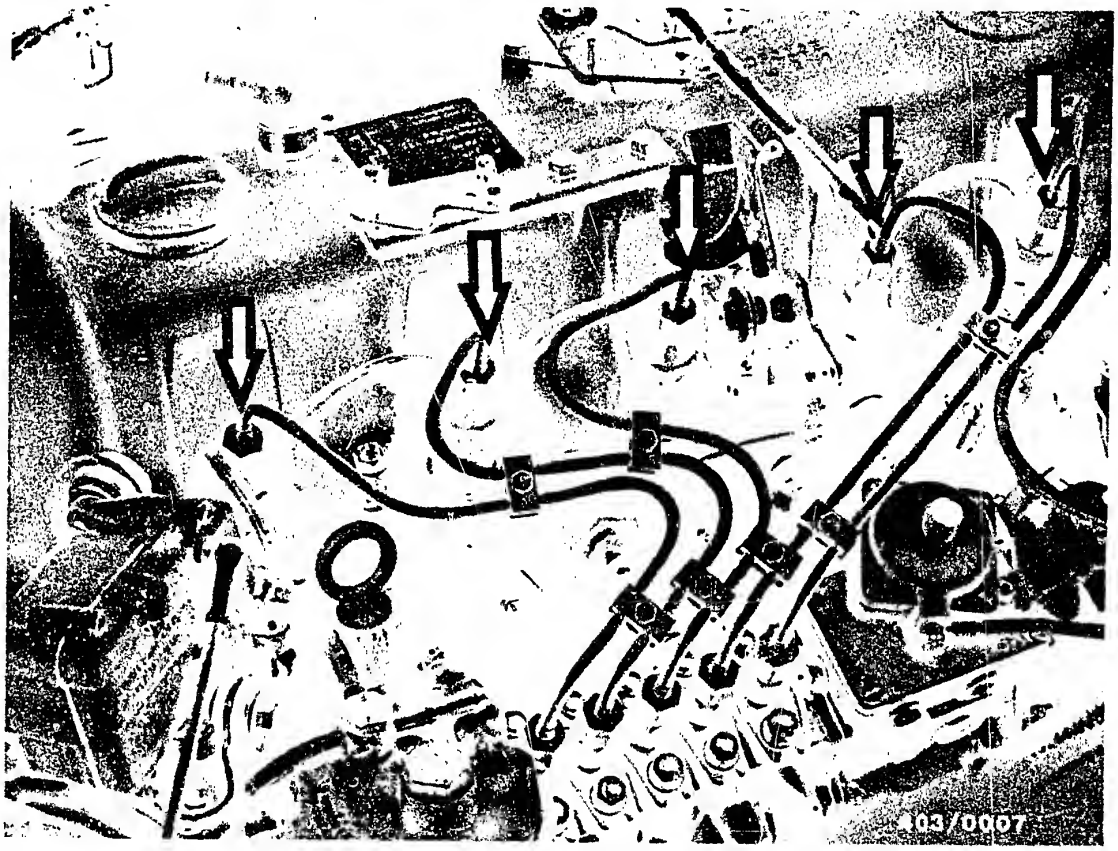


Loosen the operating knob of the hand primer and operate the hand primer until the fuel escaping from the inlet-union screw is free of bubbles.
Re-tighten the inlet-union screw.

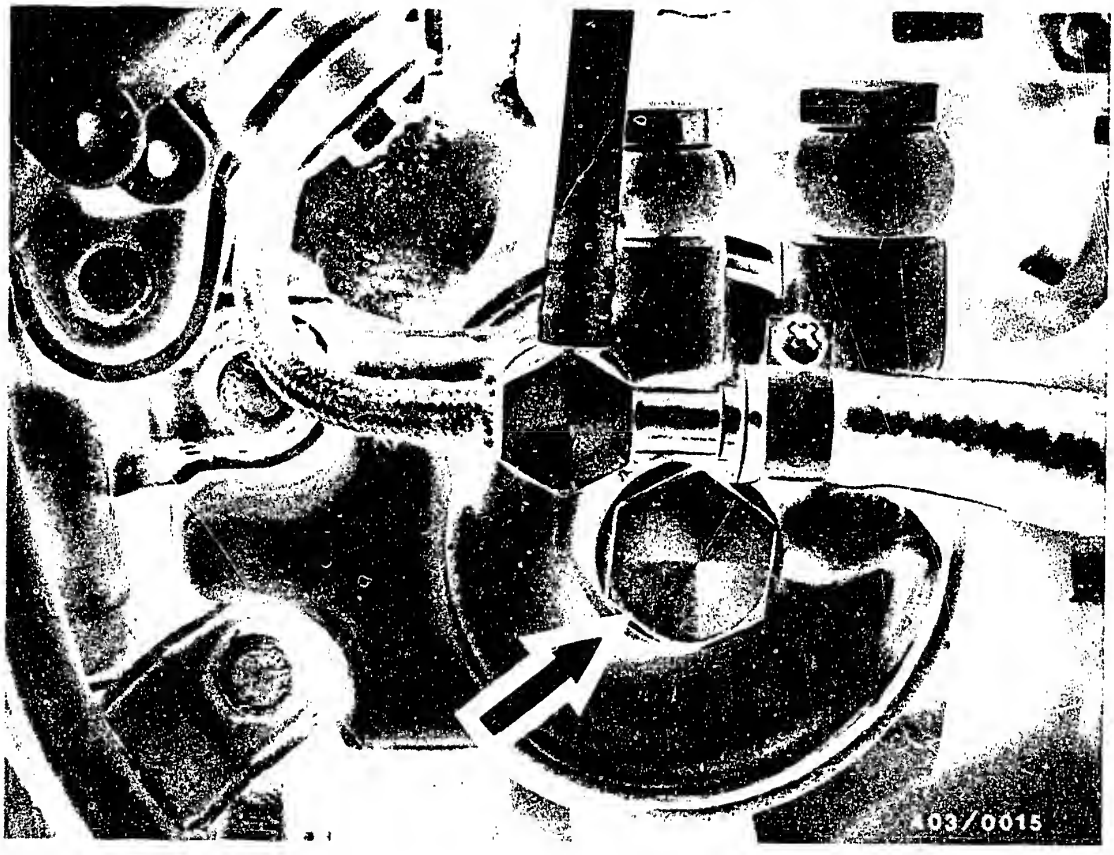
Continue to operate the hand primer until the overflow valve on the injection pump opens (audible chattering noise).

Re-tighten the operating knob on the hand primer.

This forces the pump plunger onto a seal ring and the hand primer is sealed. If the operating knob is loosened, the hand primer leaks during operation so that air can enter the fuel system.

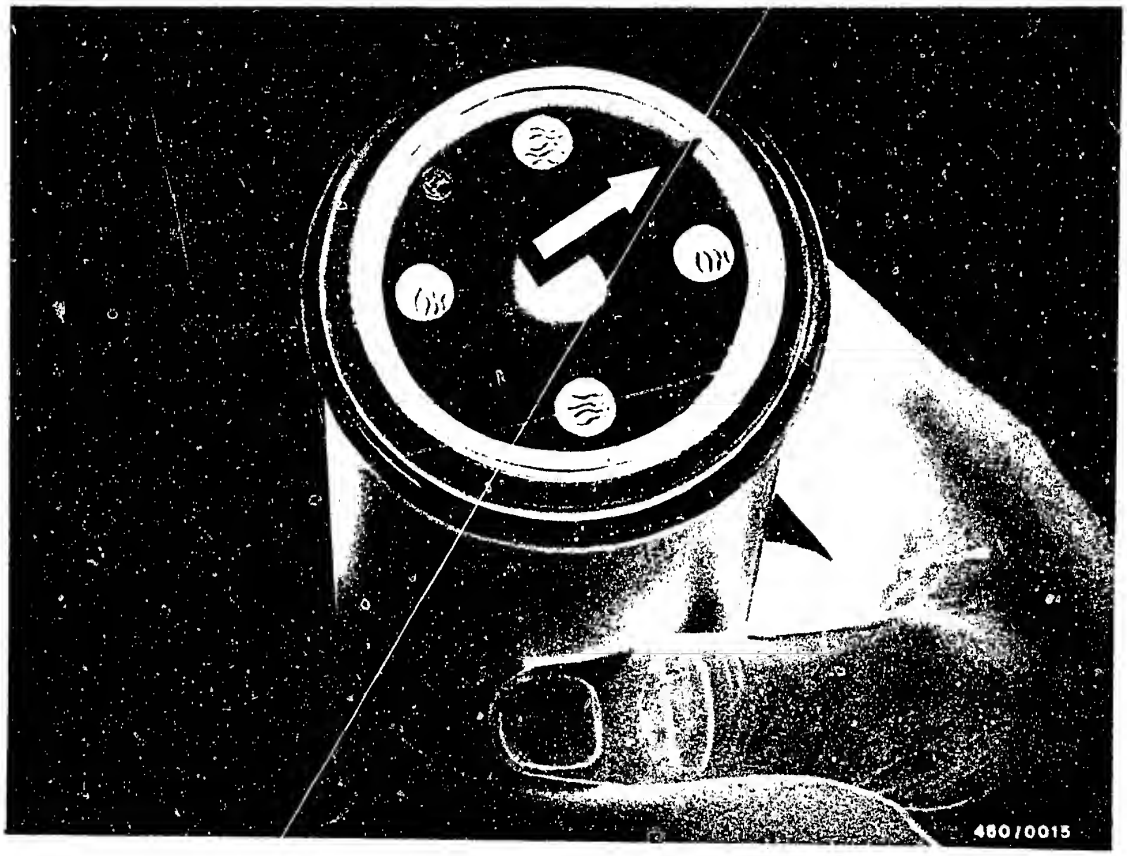


Loosen the union nuts of the fuel-injection tubing on the nozzle holders.
Operate the starting motor without pre-heating until fuel escapes at the union nuts of the nozzle holders.
Tighten the union nuts.
Operate the starting motor until the engine starts.

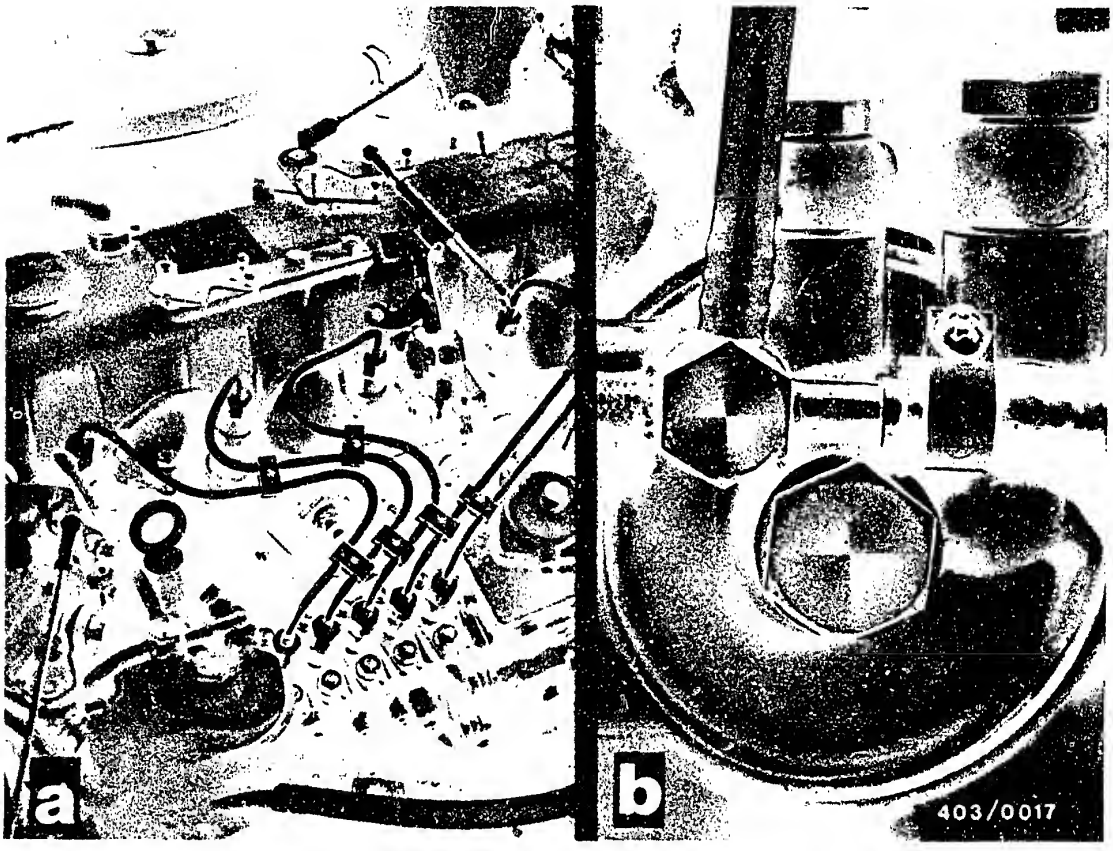


11. Replacing the filter box

Loosen the fastening screw (arrow) and unscrew the filter cover.
Catch escaping fuel.



Rub diesel fuel into the rubber seal (arrow) of the new filter box.
Screw the filter box into the cover by hand and tighten.
Check the fuel filter for leaks.



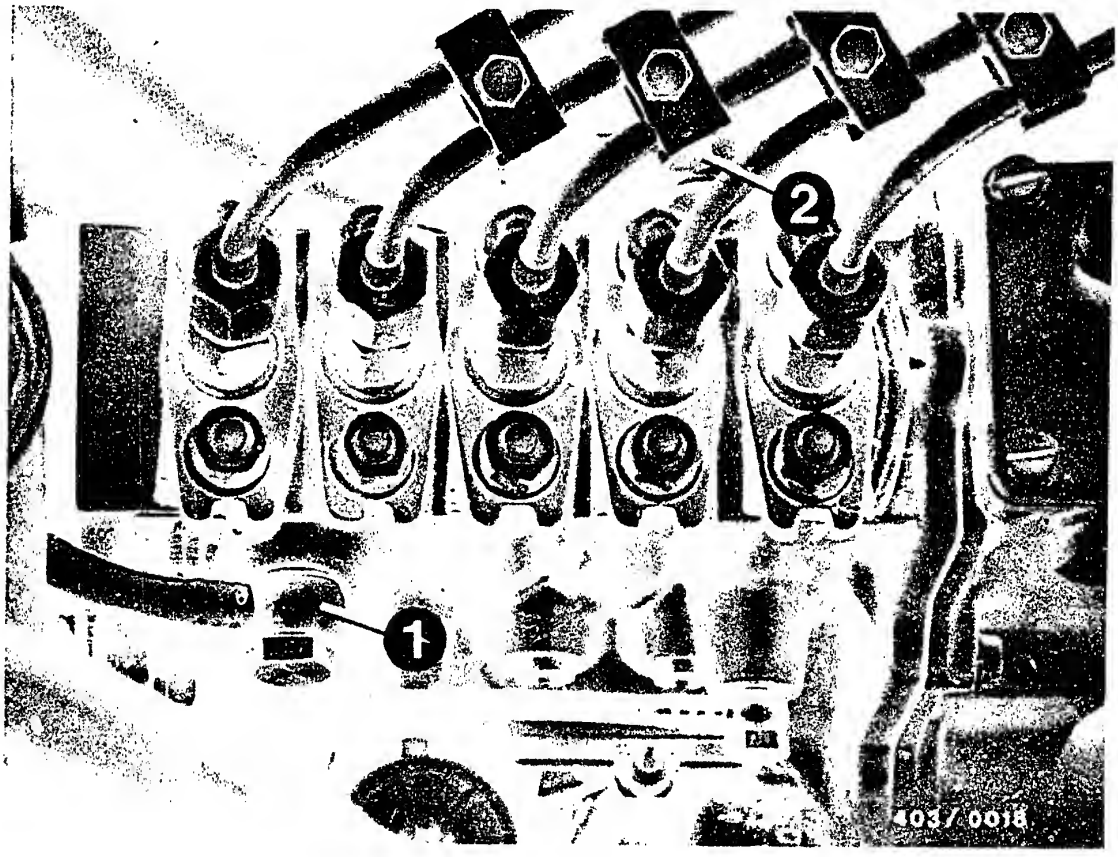
12. Checking the fuel-injection system for leaks

Perform leak test with engine at normal operating temperature.

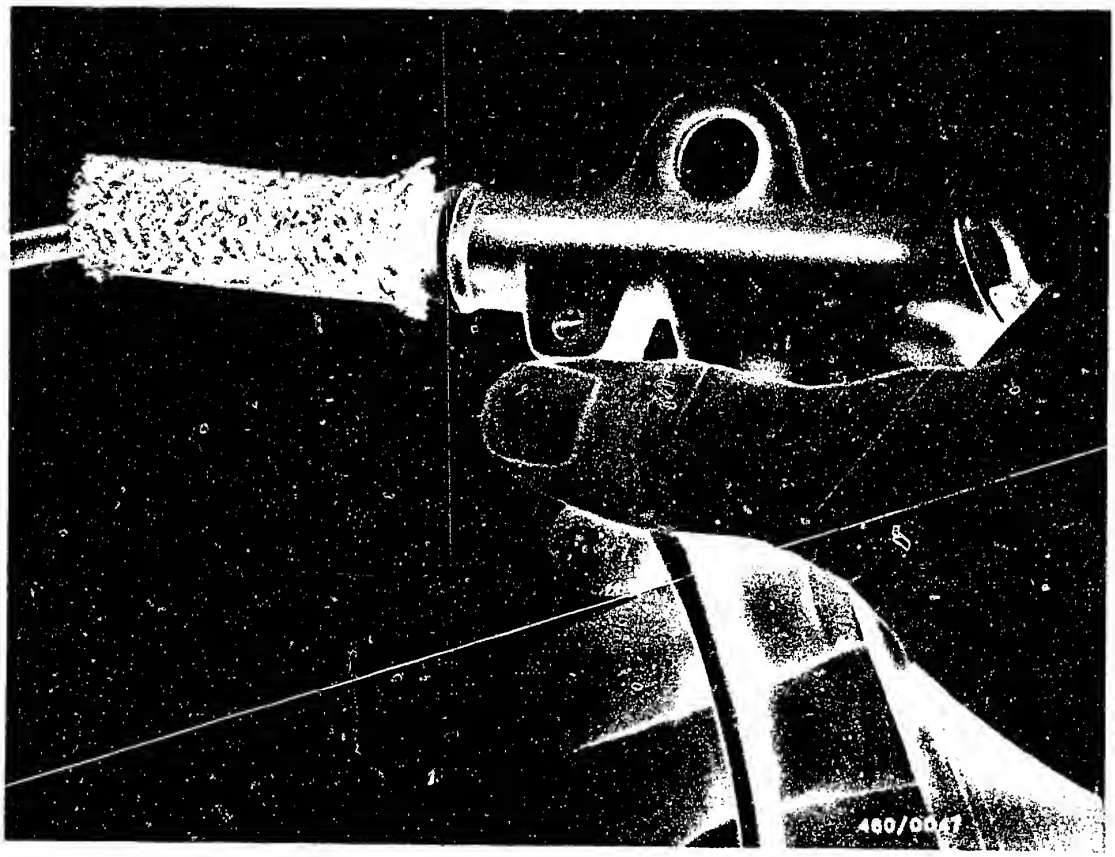
During leak test, check all fuel line connection points.

Pay particular attention to:

- Connections on nozzle holders (Fig. a)
- Connections on fuel filter (Fig. b)



- Delivery-valve holders at the individual outlets. Perform visual inspection of fuel lines for hairline cracks.
- Inlet line (1) and return line (2) on the injection pump.



13. Checking the fuel lines

Subject suspect fuel lines to a visual inspection.

If there is detectable pinching or kinking, the fuel line in question must be removed.

Check fuel line for throughflow using compressed air and clean if necessary.

A suitable hose piece may be used as a side seal for blowing out the fuel lines.

14. Smoke test - checking the air filter

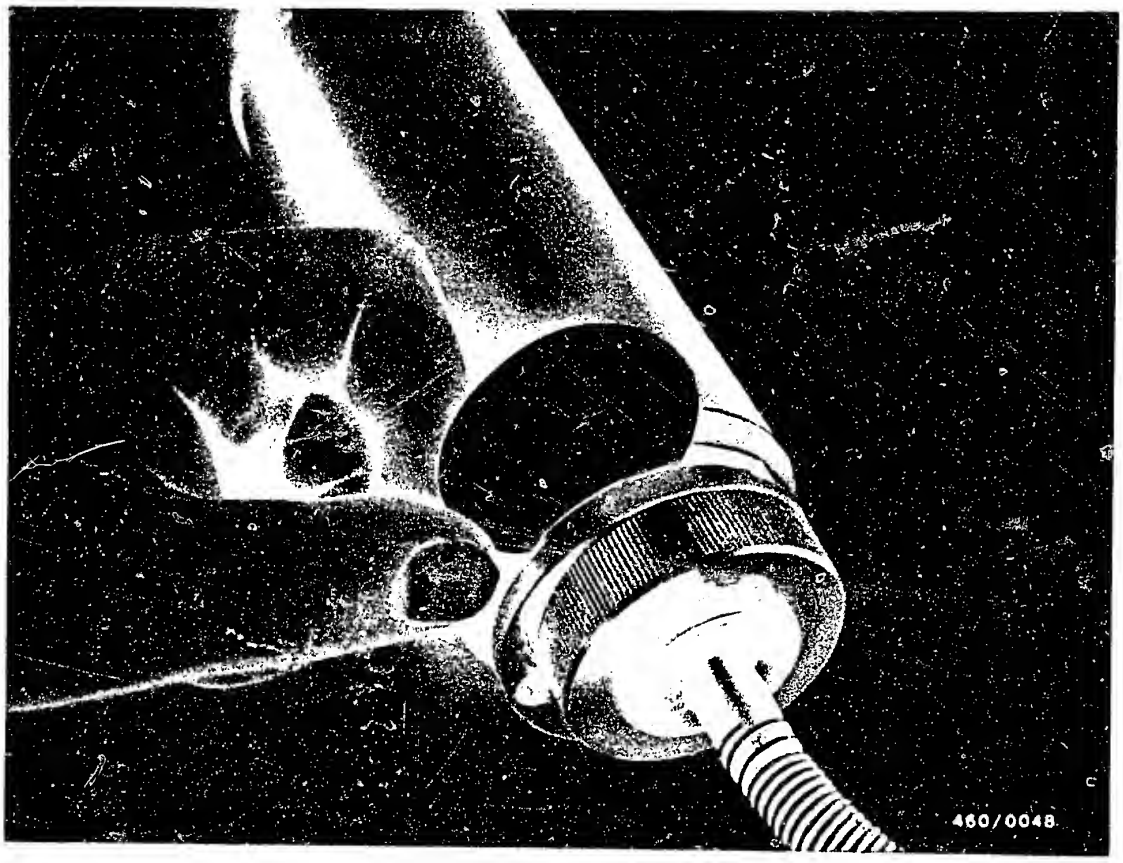
14.1 Smoke test

Summary of the contents of the legal regulations (as at April 1978). Applicable to Federal Republic of Germany.

This regulation applies only to the homologation of motor vehicles having at least 4 wheels with a maximum permissible speed of more than 25 km/h. A smoke emission test is not prescribed for official general inspections.

Parts which may have an influence on environmental pollution must be designed in such a way that the legal requirements are met during operation and despite vehicle vibration.

This applies in particular to cold-start devices and full-load stops. The Rheinland-Westfälische TÜV (Technical Inspection Bureau of Rhineland-Westfalia) in Essen is the sole approval agency.

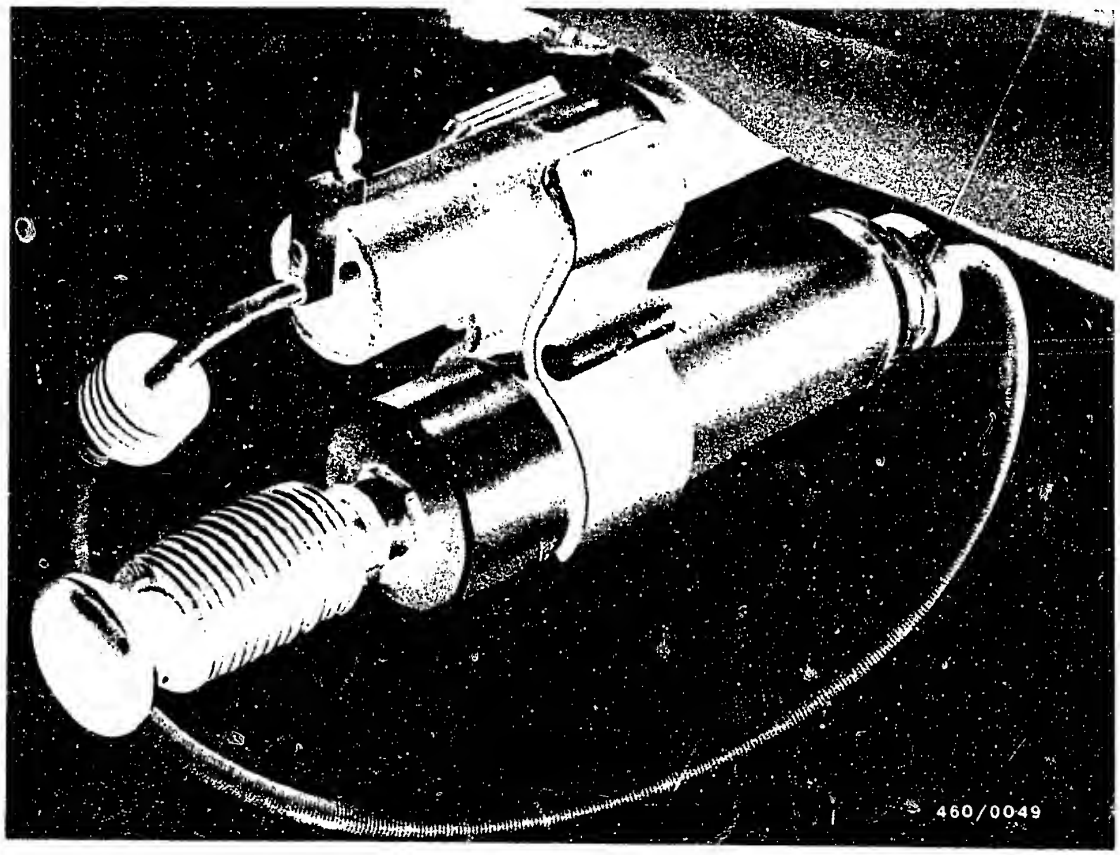


14.1.1 Test setup

The smoke test is conducted using the BOSCH filter-type smokemeter.
The filter-type smokemeter consists of the following units:

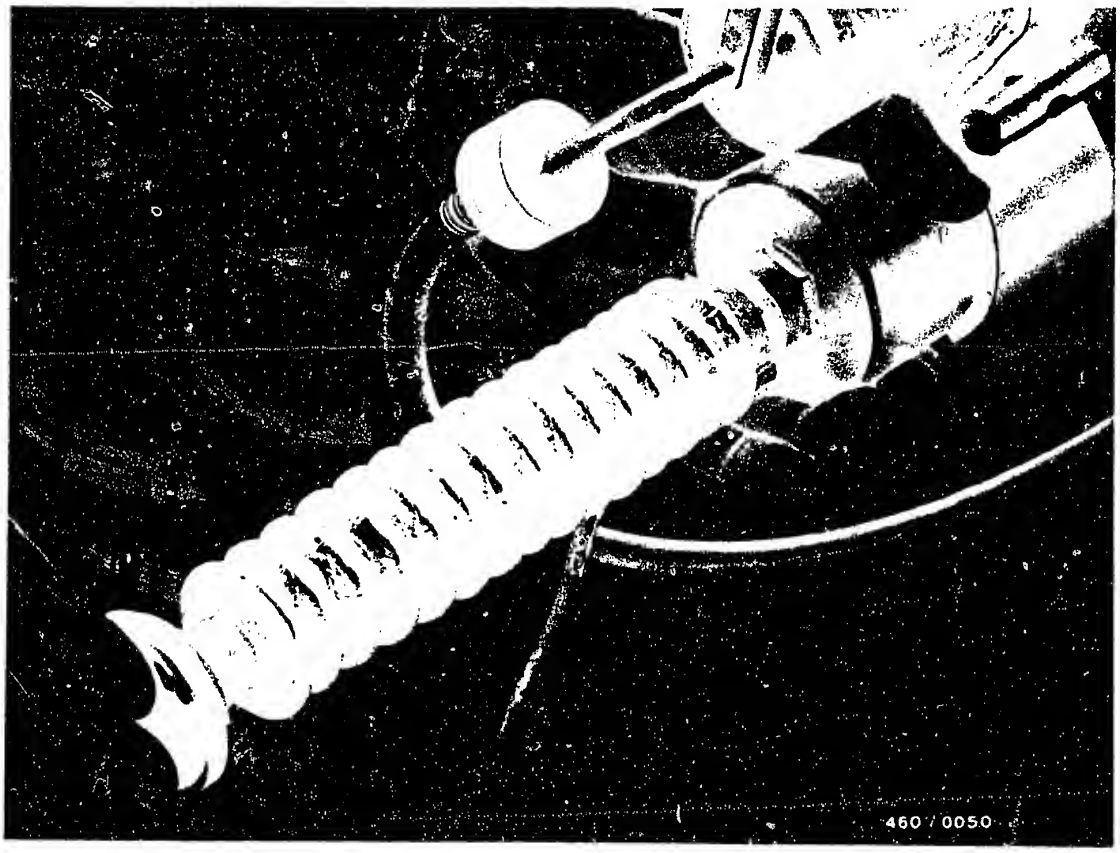
Accessories box with proportioning pump	0 681 169 038
Evaluation units	0 681 169 039

Insert filter plate into proportioning pump.



Mount sampling pump on exhaust pipe using appropriate clamp.

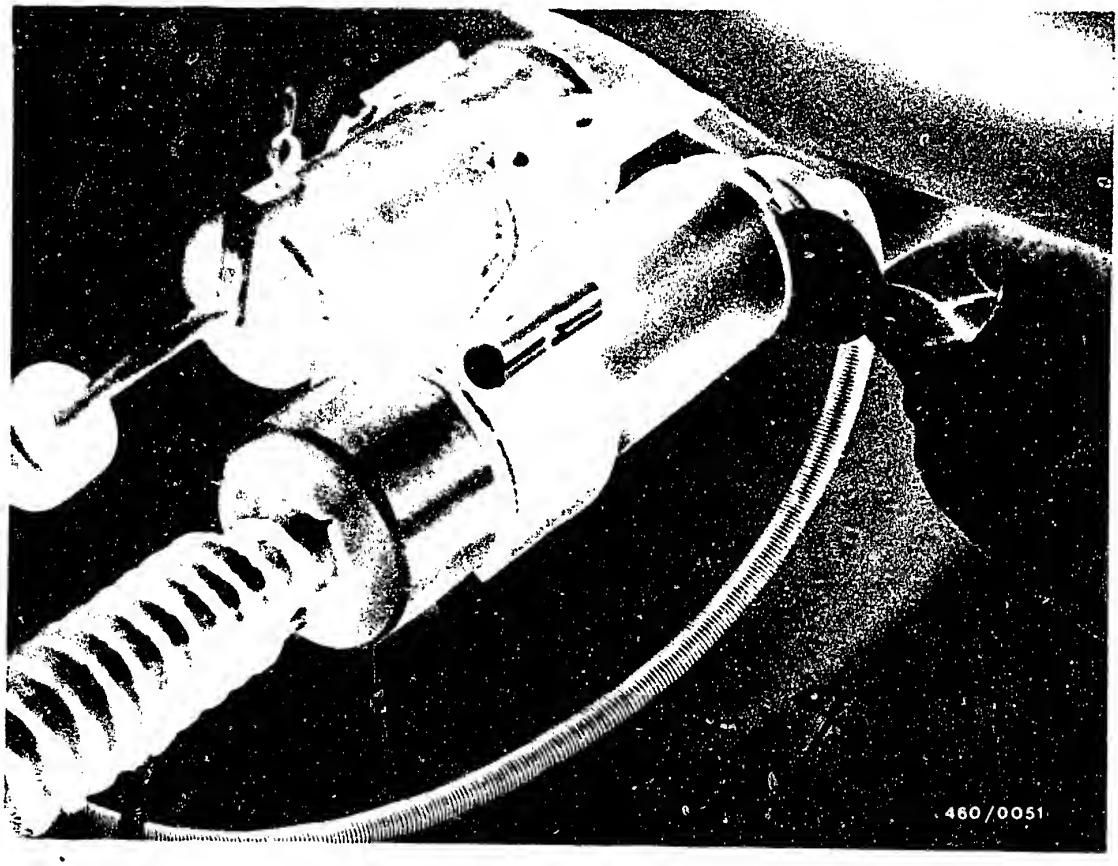
Introduce exhaust-sample pickup as far as possible into exhaust pipe and clamp in position.



14.1.2 Test procedure

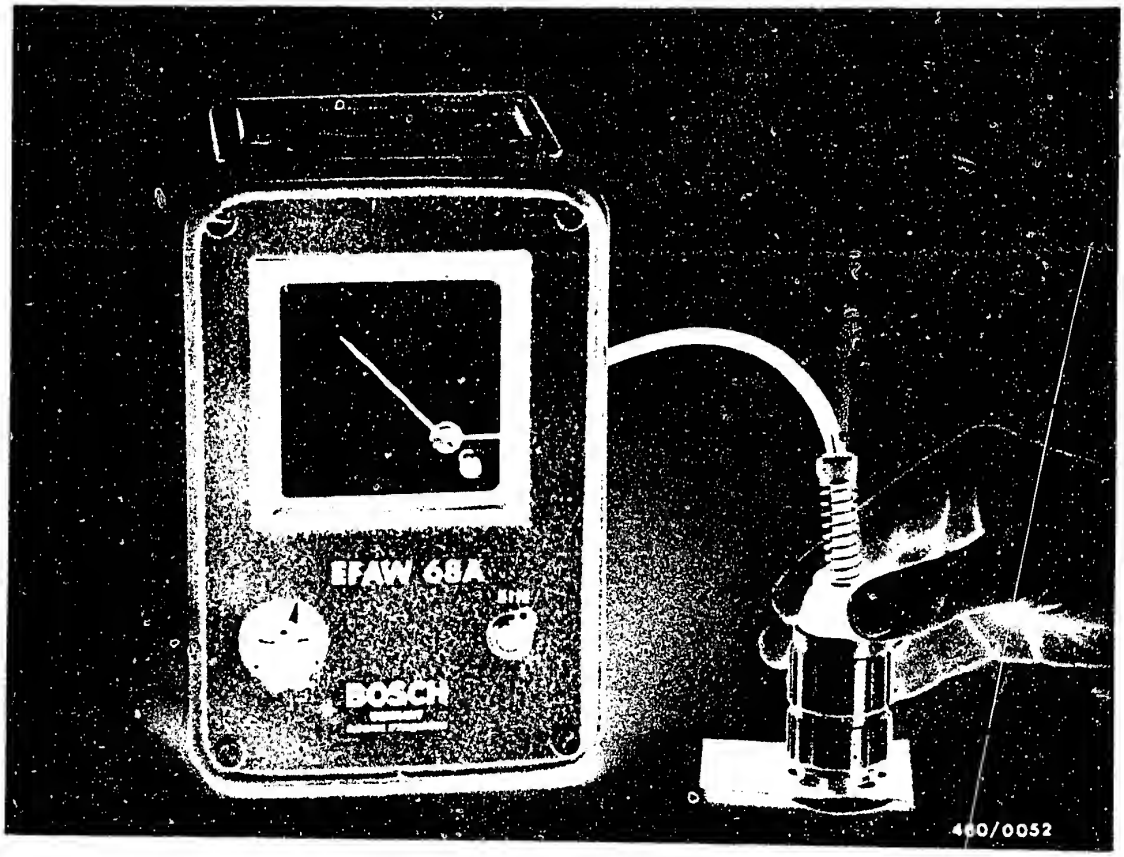
Set proportioning pump by pressing in the black push-button. Take rubber ball on triggering hose and enter passenger compartment.
The test can be performed on the chassis dynamometer or on the road (gradient). (Test on chassis dynamometer is preferable.)
Select any gear and drive at full throttle. Determine maximum possible speed. With the accelerator in the same position, load the engine by 40% so that 60% of the maximum speed is reached. Maintain this load condition for 5 seconds and then trigger the sampling pump by pressing the rubber ball.

Switch off engine.

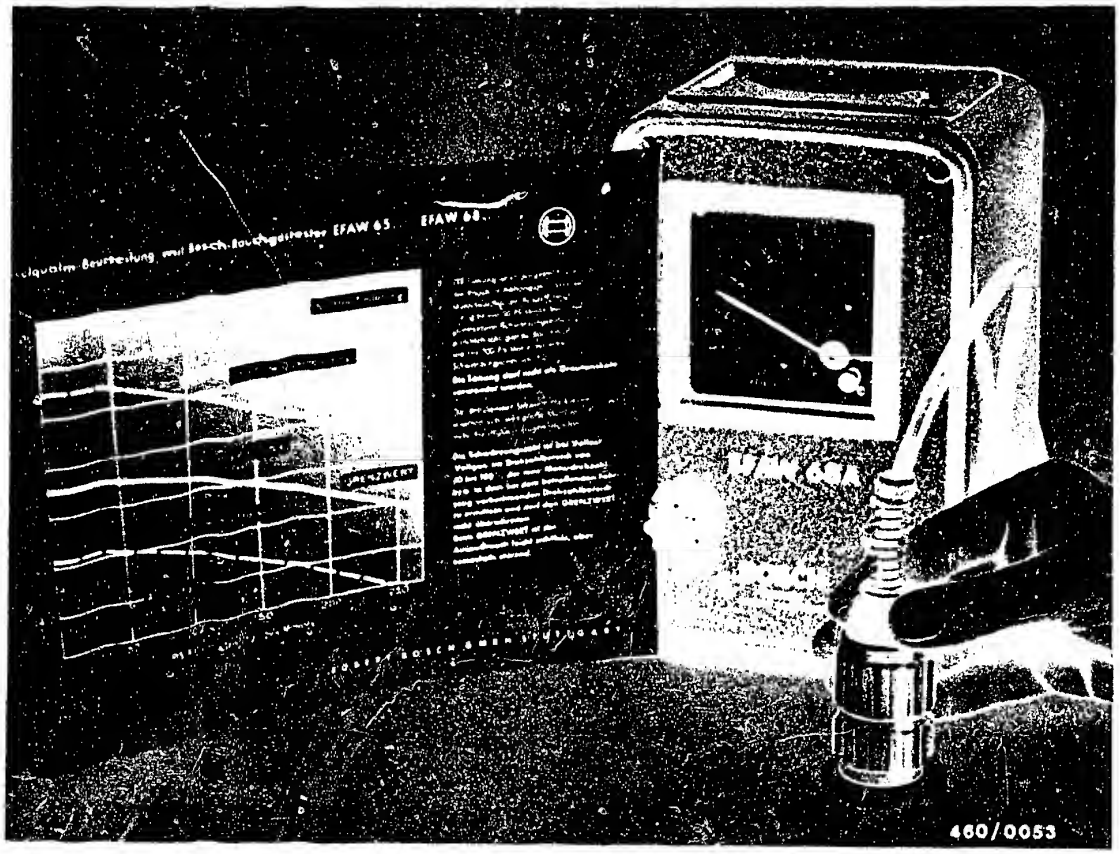


Caution!
During the following operation, pay attention to the fact that the exhaust pipe has been heated due to the running of the engine.

Remove filter plate from sampling pump.



Place calibrating plate on approx. 10 clean filter plates. Place photocell of evaluating unit on calibrating plate. Switch on unit and set to 5.0 opacity. Remove calibrating plate and place photocell on clean filter plates. The unit must indicate 0.0 opacity. If necessary change batteries.
With unit switched off, pointer must indicate 10.0 opacity. Deviations indicate that the unit is defective. Place filter plate from sampling pump onto the clean filter plates with the sooted side at the top. Place photocell on this filter plate and read off the smoke factor on the evaluating unit.



Compare smoke factor with evaluation sheet.

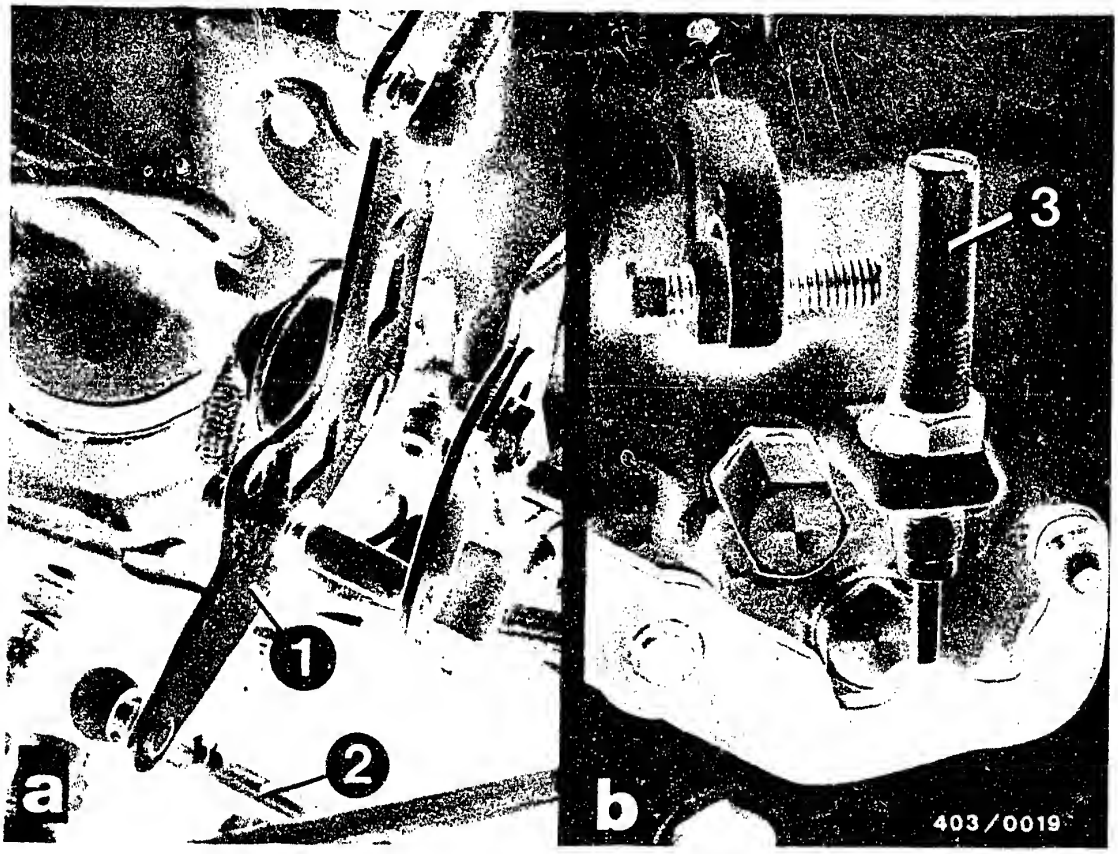
Note kW (HP-DIN) data of vehicle manufacturer.

14.2 Checking the air filter

Remove air filter and subject to a visual inspection.

Test criteria for air filter:

- Dusty air filter
- Oiled-up air filter
- Solid matter in air filter, e.g. leaves
  If in doubt, use new filter element.



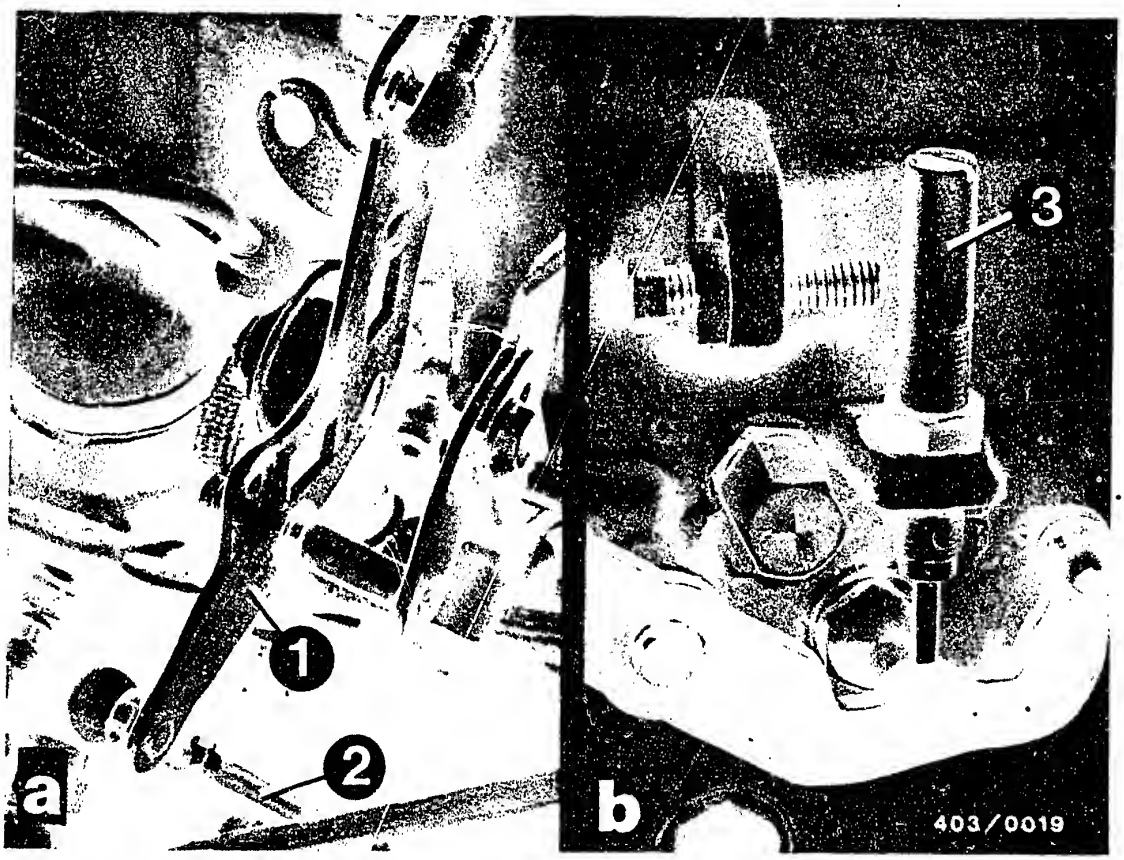
1 = Bell crank
2 = Pressure rod
3 = Idle-speed adjusting screw

15. Adjusting the idle speed

Connect motortester with adapter cable to diagnostic socket.
Unhook pressure rod (2) on bell crank (1). Check regulating linkage for freedom of movement and wear. Start engine.
For adjusting the idle speed, the engine must be at normal operating temperature (coolant temperature 80°C).

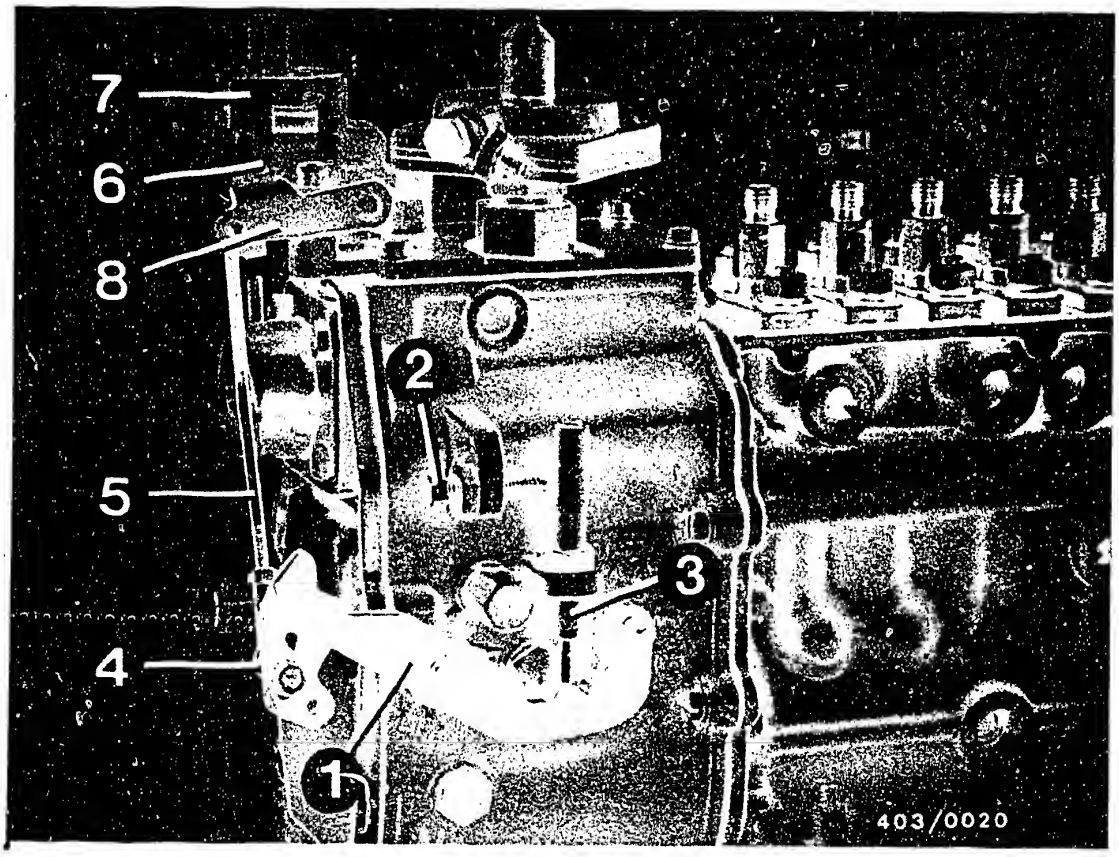
Set the engine speed to 700 - 800 min^{-1} at the idle-speed adjusting screw (3).

Turning to the right = Increases speed
Turning to the left = Reduces speed



Hook in the pressure rod (2) so that it is free of tension.

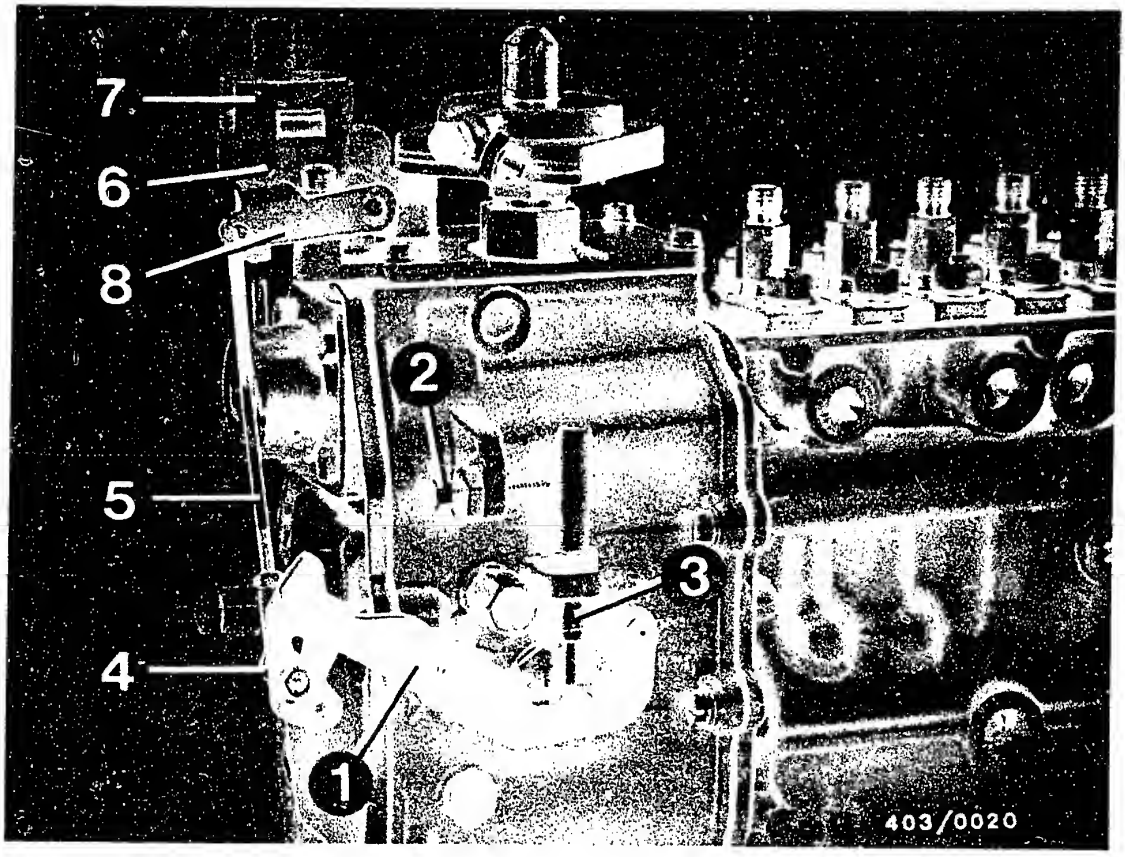
If an adjustment is necessary, adjust regulating linkage on the injection pump.
Place selector lever in drive position and switch on automatic air conditioner.
Turn the power-assisted steering to full lock; the engine must run smoothly.
If the engine stops, adjust the idle speed.



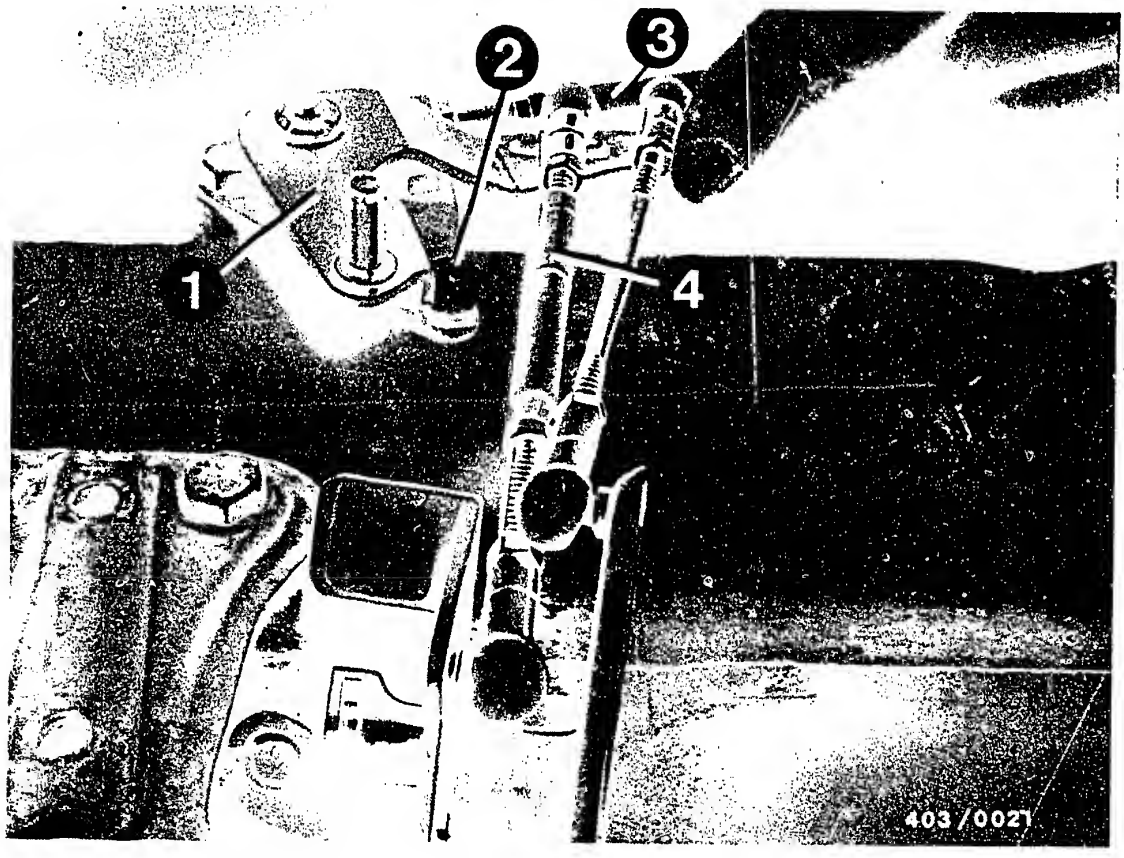
1 = Regulating lever
2 = Full-load stop
3 = Idle stop
4 = Ball head
5 = Connecting rod
6 = Full-load stop (pressure-control valve)
7 = Valve
8 = Operating lever for vacuum-control valve

15.1 Adjusting the connecting linkage (5)

Check whether the regulating lever (1) of the injection pump is up against the idle stop (3).
Check whether the connecting rod (5) is correctly adjusted. To do this, force the regulating lever (1) onto the full-load stop (2). The operating lever (8) must have max. 0.5 mm play up to the full-load stop (6).



If necessary, adjust the connecting rod (5) with the adjustable ball head (4).
The connecting rod (5) must be set to 122 mm + 1 mm, measured from the centre of the ball socket to the centre of the linkage.

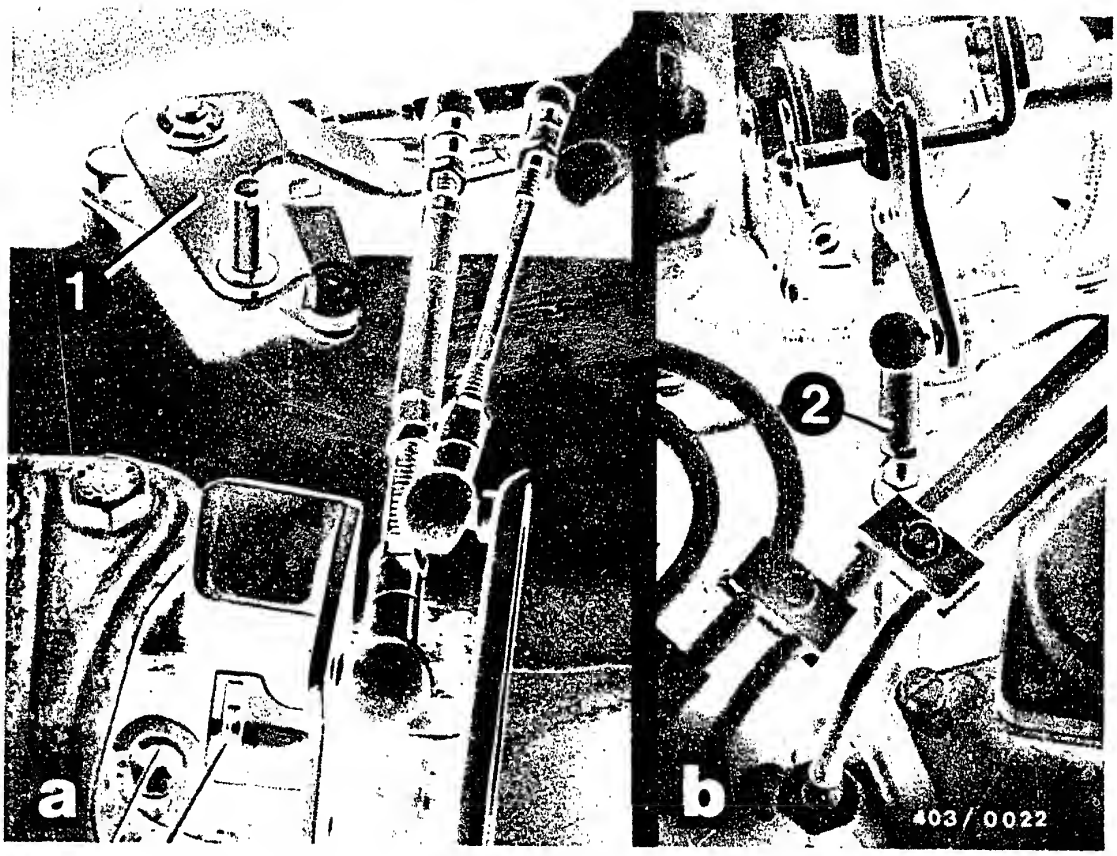


16. Adjusting the engine control

Fit the adjusting sleeve (2). The regulating lever (1) must be up against the sleeve.

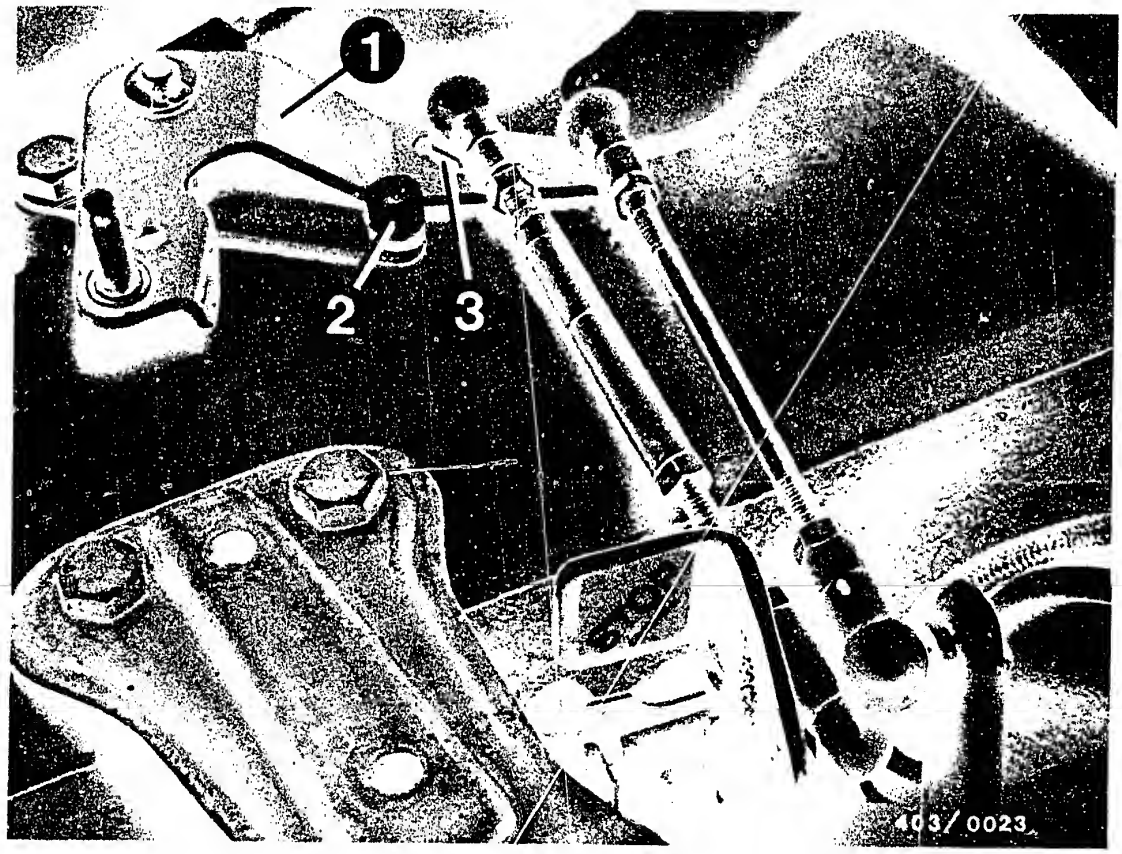
Remove the locking element and unhook the control-pressure rod (3).

When fully extended, adjust the idle-travel rod (4) to 154 mm and hook in.
Pre-setting dimension measured from centre to centre of ball head.



Force the regulating lever (1) onto the idle stop.

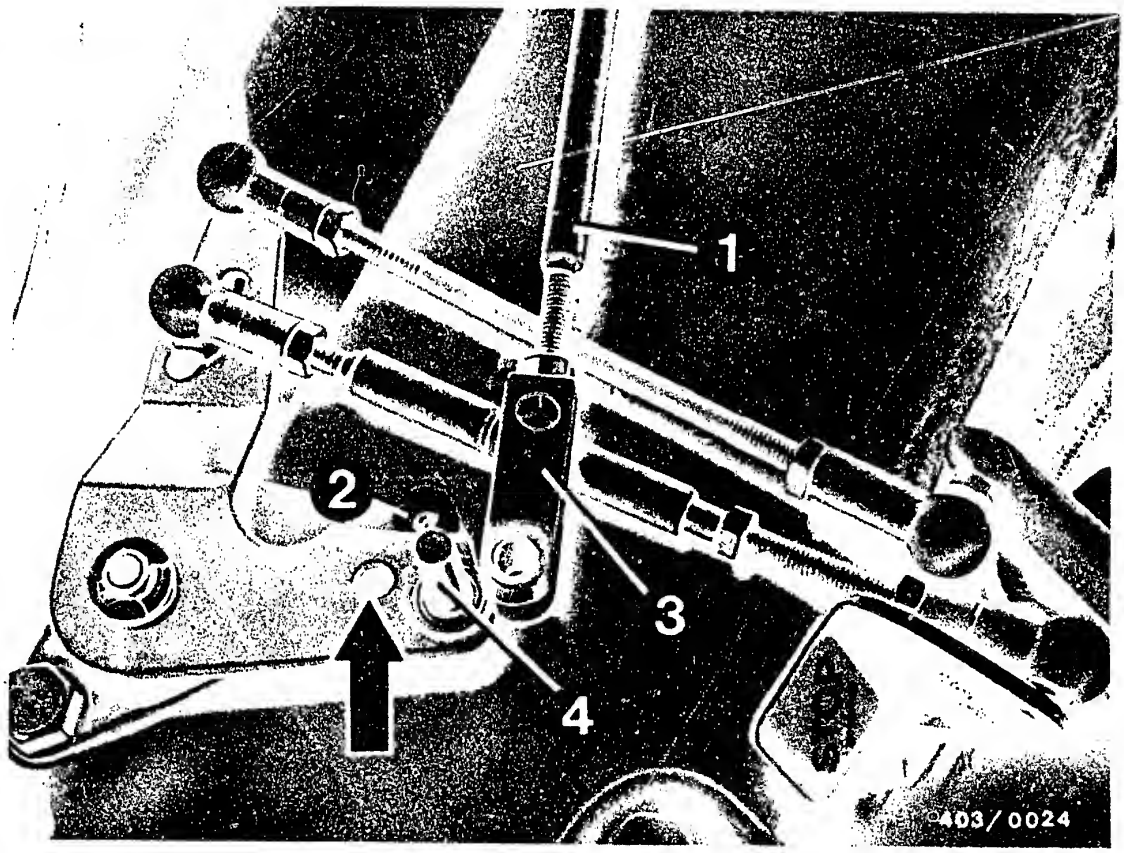
Set the pressure rod (2) so that it can be hooked in free of tension.



16.1 Adjusting the full-load stop

Force the regulating lever (1) onto the full-load stop so that it is up against the adjusting sleeve (2).

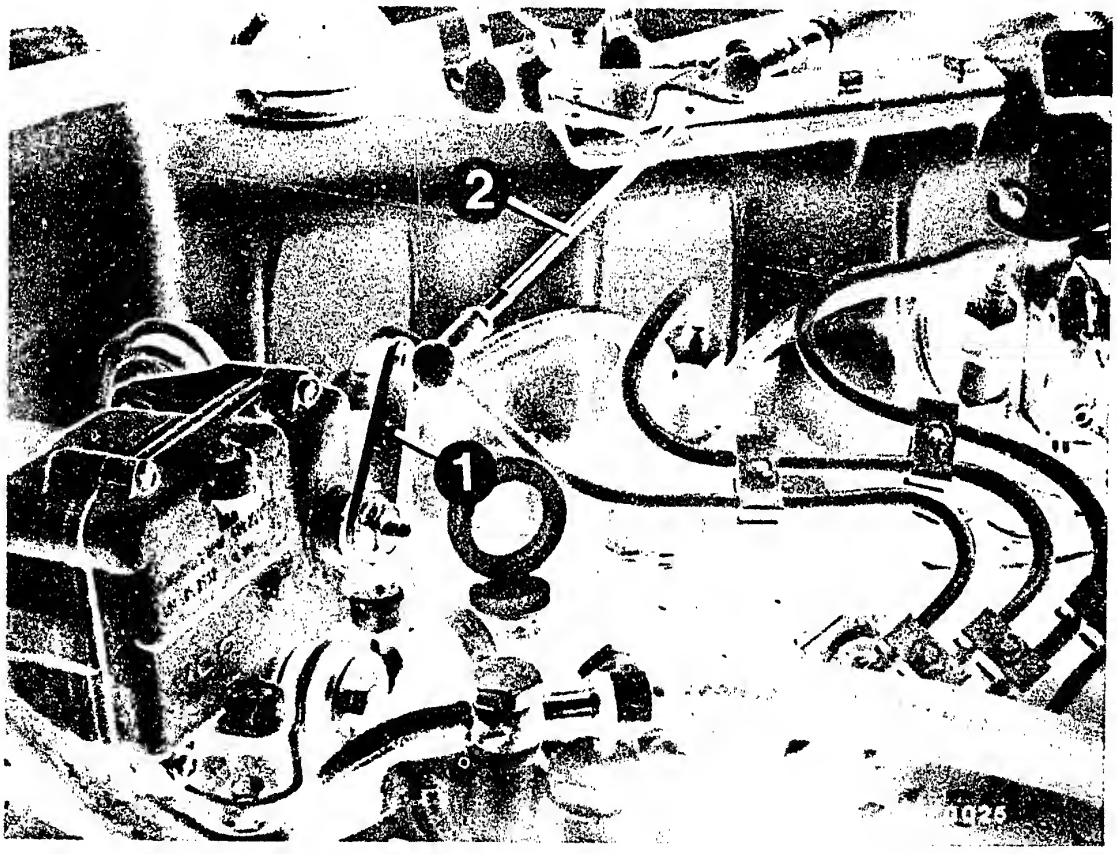
If an adjustment is necessary, loosen the nut of the ball head (3).
Move the ball head in the slot so that the regulating lever of the injection pump is up against the full-load stop. In this position, tighten the ball head (3).



16.2 Adjusting the control-pressure rod

Force the regulating lever against the idle stop so that the idle stop is up against the adjusting sleeve (2).

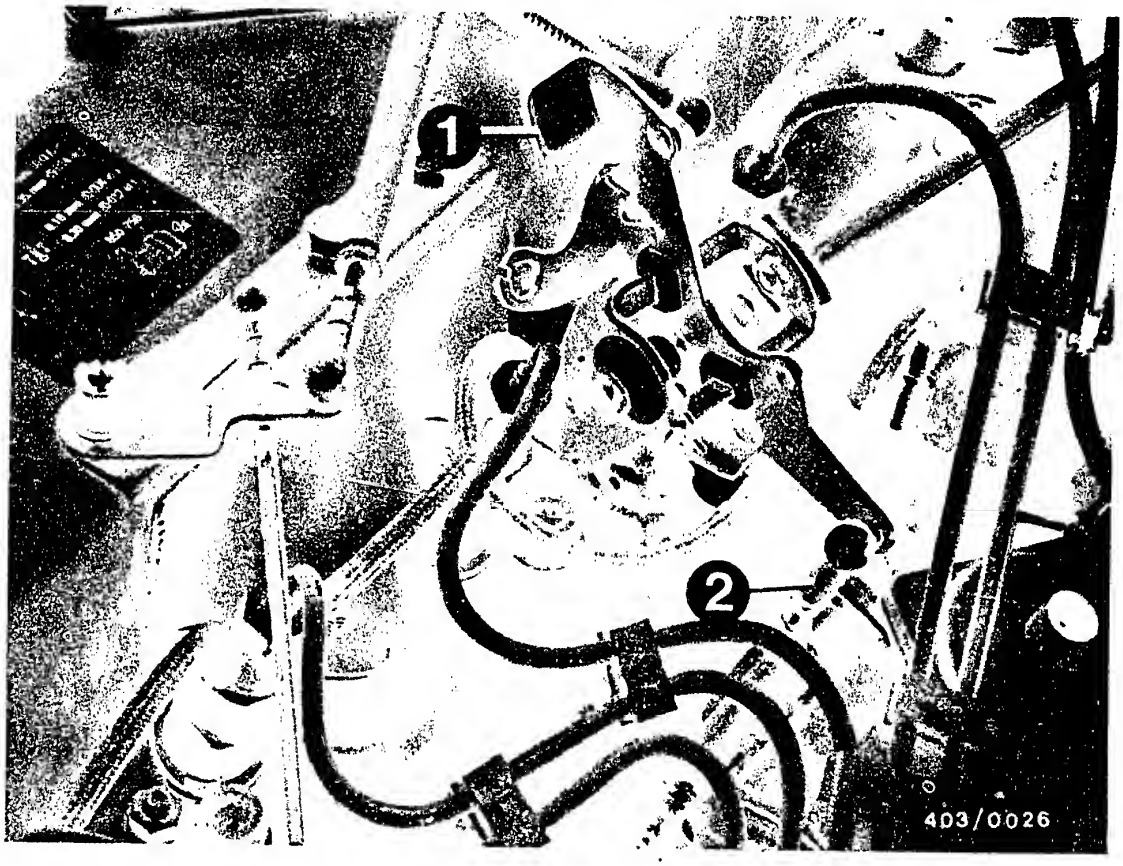
When checking the length, the control-pressure rod (1) is to be held by the test hole (arrow) next to the pin (4).
Set the control-pressure rod to a tension-free length.
Remove the adjusting sleeve.
Hook in the control-pressure rod and secure.
Note
To facilitate assembly, when hooking in the end piece (3) make sure that the trademark is at the top.



16.3 Adjusting the cruise control

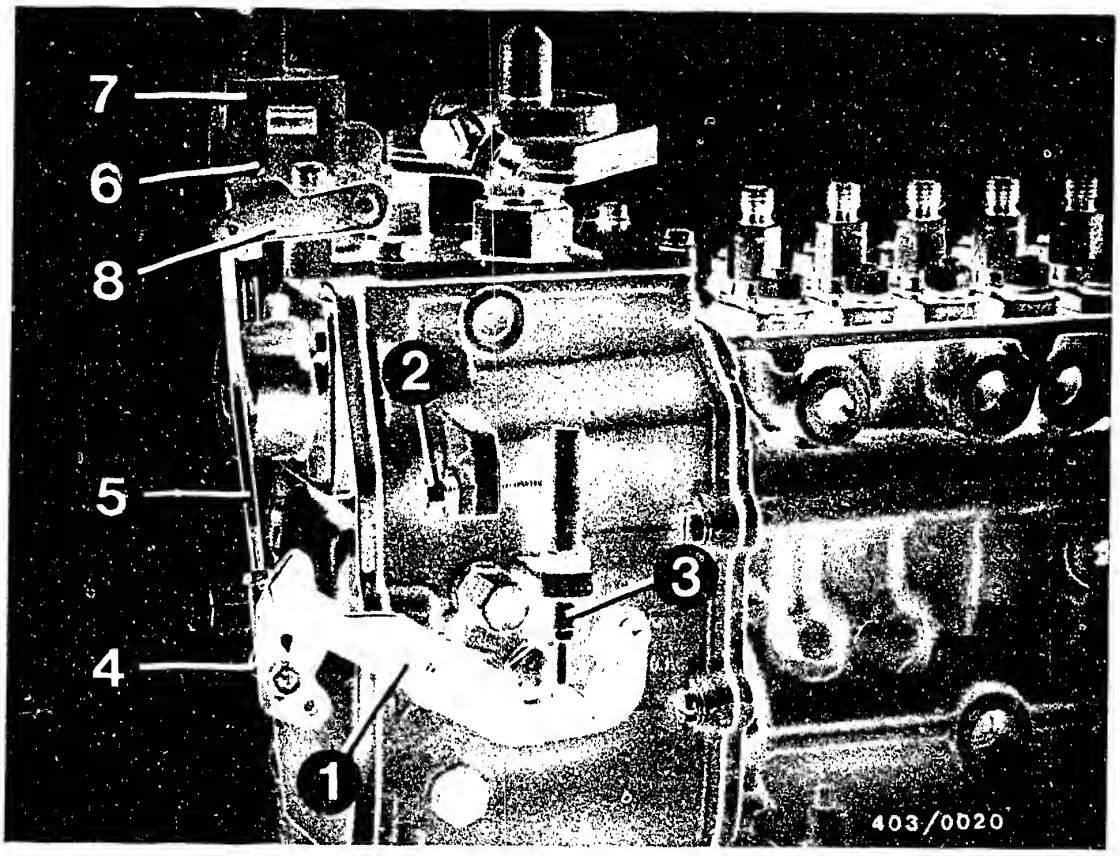
Check whether the final controlling element is up against the idle stop of the cruise control.
To do this, unhook the connecting rod (2) and force the lever of the final controlling element (1) in a clockwise direction onto the idle stop.
When hooking in the connecting rod, make sure that the lever of the final controlling element is forced about 1 mm away from the idle stop.

If necessary, adjust the connecting rod.



16.4 Testing the operation of the emergency-stop button

Operate the engine at idle speed.
Press the emergency-stop button (1).
The engine must stop.
If an adjustment is necessary, adjust the pressure rod (2).



17. Adjusting the vacuum-control valve

If the vacuum-control valve or the injection pump is replaced, the vacuum-control valve on the adjustable ball head (4) must be adjusted. Force the regulating lever (1) to full load so that it is up against the stop (2). Loosen the ball head (4) and move it in its slot so that there is about 0.5 mm play between lever (8) and stop (6).

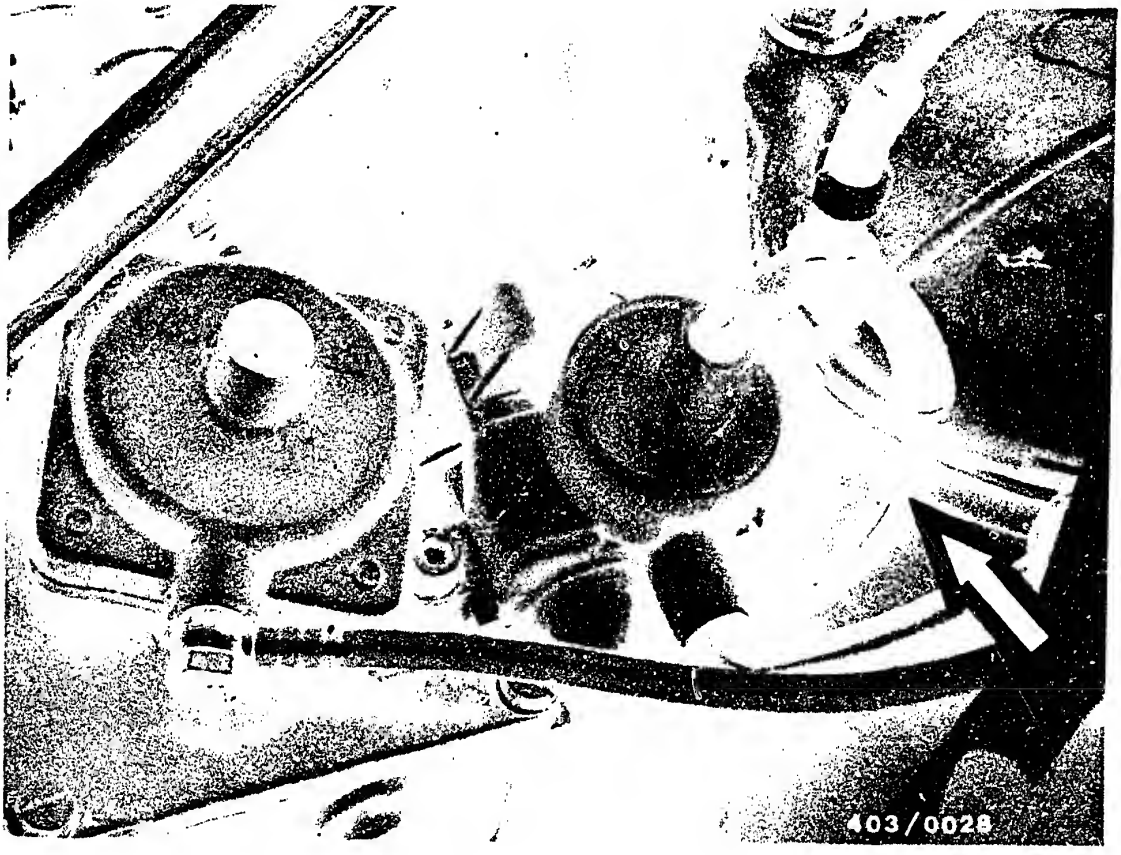
Tighten the ball head (4), then check the adjustment once again.

16.1 Testing the vacuum system

Turn the ignition key in the steering lock to position 2. Pull the brown line (arrow) out of the connecting piece and connect the suction line of the "hand vacuum pump" (Mityvac) to the brown line.
Using the hand vacuum pump, evacuate the line system to 400 mbar vacuum.
If the pressure gauge indicates a pressure rise, the valve for the key-operated starting system on the steering lock is leaking.
Replace valve for key-operated starting system on steering lock.

Caution:
Before replacing the valve of the key-operated starting system and the vacuum unit of the injection pump, check the hose lines and their connecting pieces.

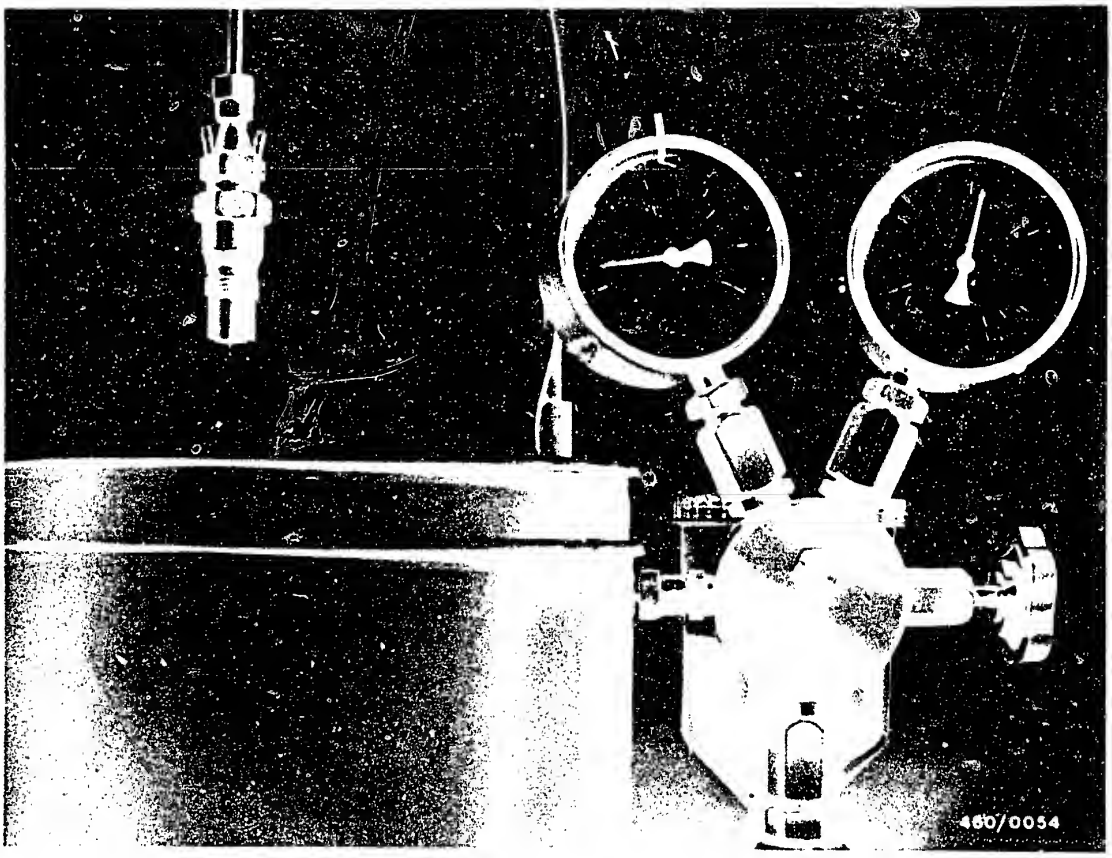
Turn back the ignition key in the steering lock to position "1" or "0".
Evacuate the system to 400 mbar vacuum with the hand vacuum pump.
If the pressure gauge indicates a pressure rise, the vacuum unit or the valve may be leaking.



Remove the control line (arrow) with connecting piece from the vacuum unit of the injection pump. Connect suction line of hand vacuum pump to the vacuum unit and evacuate to 400 mbar vacuum.
If the pressure gauge indicates a pressure rise (max. 6 mbar/min at 400 mbar vacuum) the vacuum unit of the injection pump is leaking.

Replace vacuum unit of injection pump.

If the reading on the pressure gauge does not change, the vacuum unit of the injection pump is O.K. and the leak is in the valve for the key-operated starting system. Replace valve for key-operated starting system.



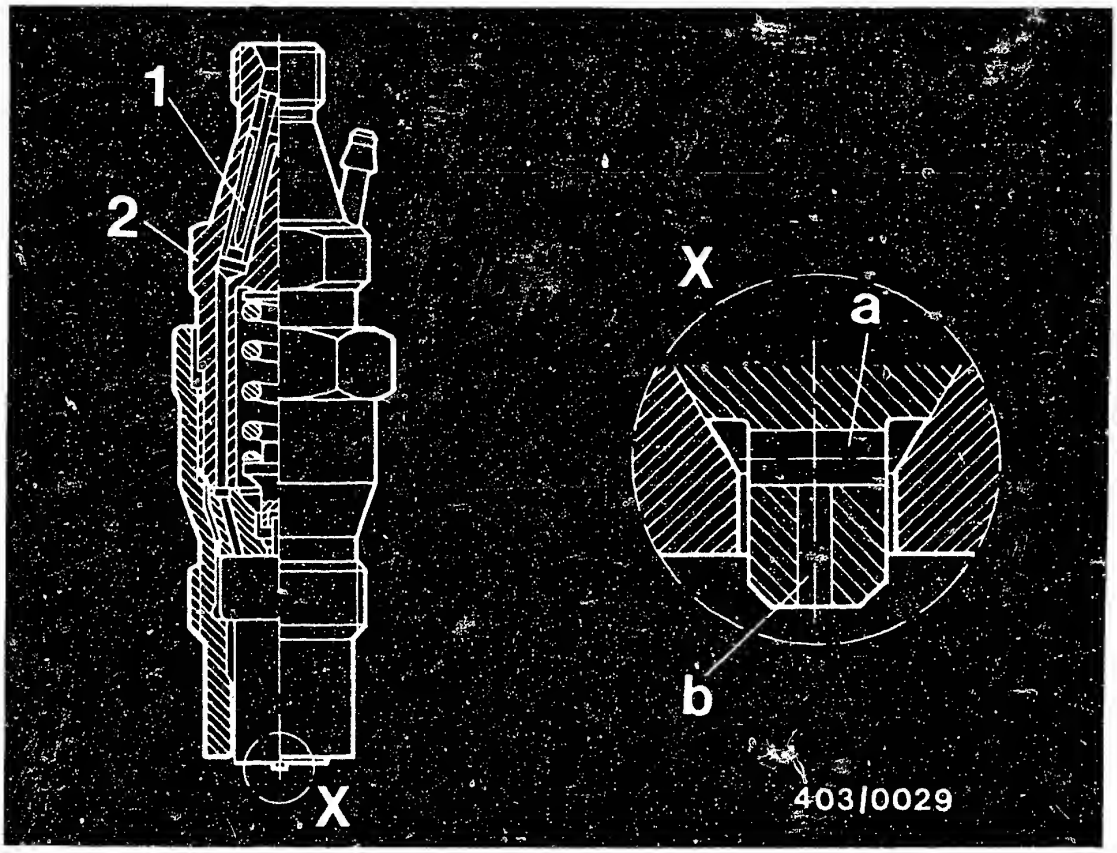
18. Testing the injection nozzles

Remove injection nozzles.

The test is performed using the nozzle tester EFEP 60 H 0 681 200 502.

Mount injection nozzle with nozzle holder on nozzle tester.

Caution:
When testing injection nozzles, make sure that the fuel spray does not strike your hands since, due to the high pressure, the fuel will penetrate into the skin and may cause blood poisoning.



The injection nozzle is a hole-type pintle nozzle. It differs from the previous nozzle DN 0 SD 220 due to a transverse bore (a) and a longitudinal bore (b) in the pintle and also due to a narrower throttling gap. In addition, the top part of the injection nozzle (2) is fitted with a maintenance-free edge-type filter (1).

18.1 Chatter test

Owing to its special structural features the so-called throttling nozzle chatters very softly. A chatter test is only possible between 1...2 downward movements/second. If the test speed is increased the chattering stops. The calibrating oil then escapes from the nozzle with a hissing noise. The nozzle chatters with a high-pitch sound only when the lever is moved quickly (approx. 4...6 downward movements/second).

18.2 Testing the injection pressure

Switch on pressure gauge.

Slowly force lever downward. When nozzle starts to squirt, read off injection pressure.

In the case of deviations from the nominal value, the nozzle-opening pressure must be adjusted by shims behind the pressure spring in the nozzle-holder assembly.

Nominal value: 135 + 8 bar.

18.3 Leak test

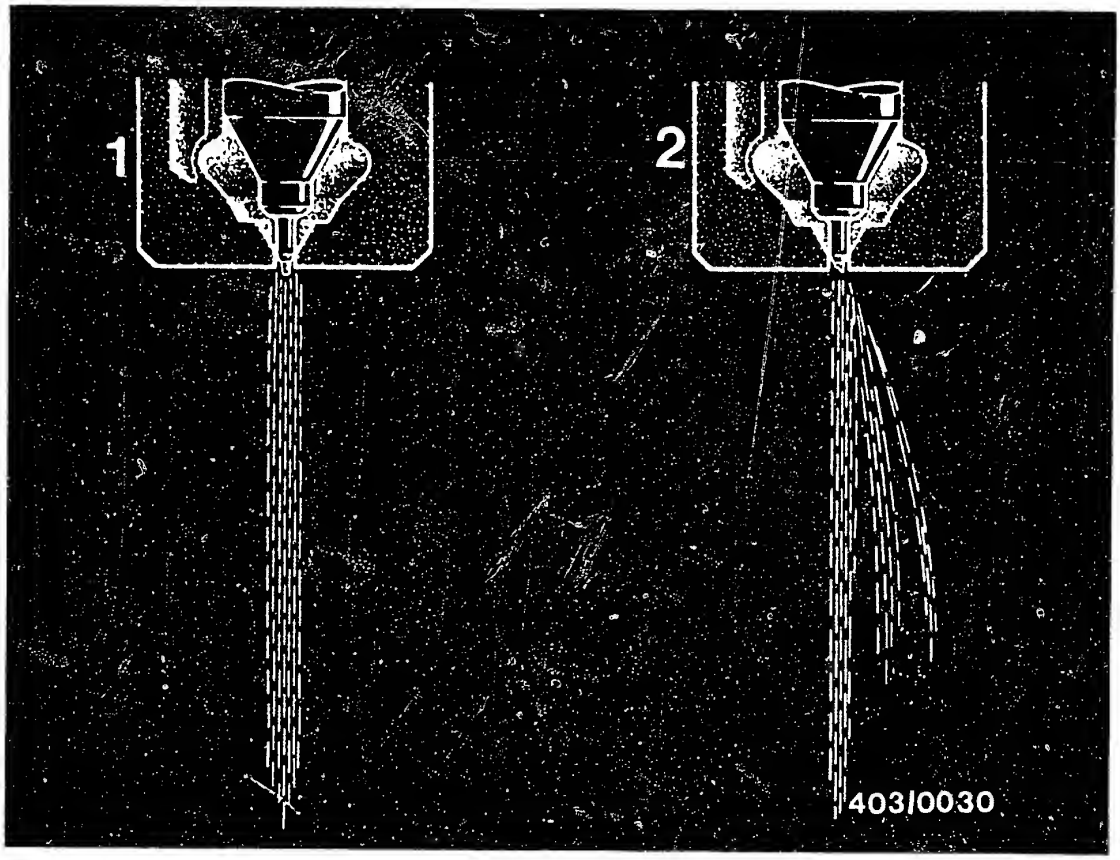
Pressure gauge switched on.

Slowly force lever downward and maintain pressure approx. 20 bar below opening pressure for 10 seconds. The nozzle must not drip during this period.

18.4 Spray test

Spray pattern

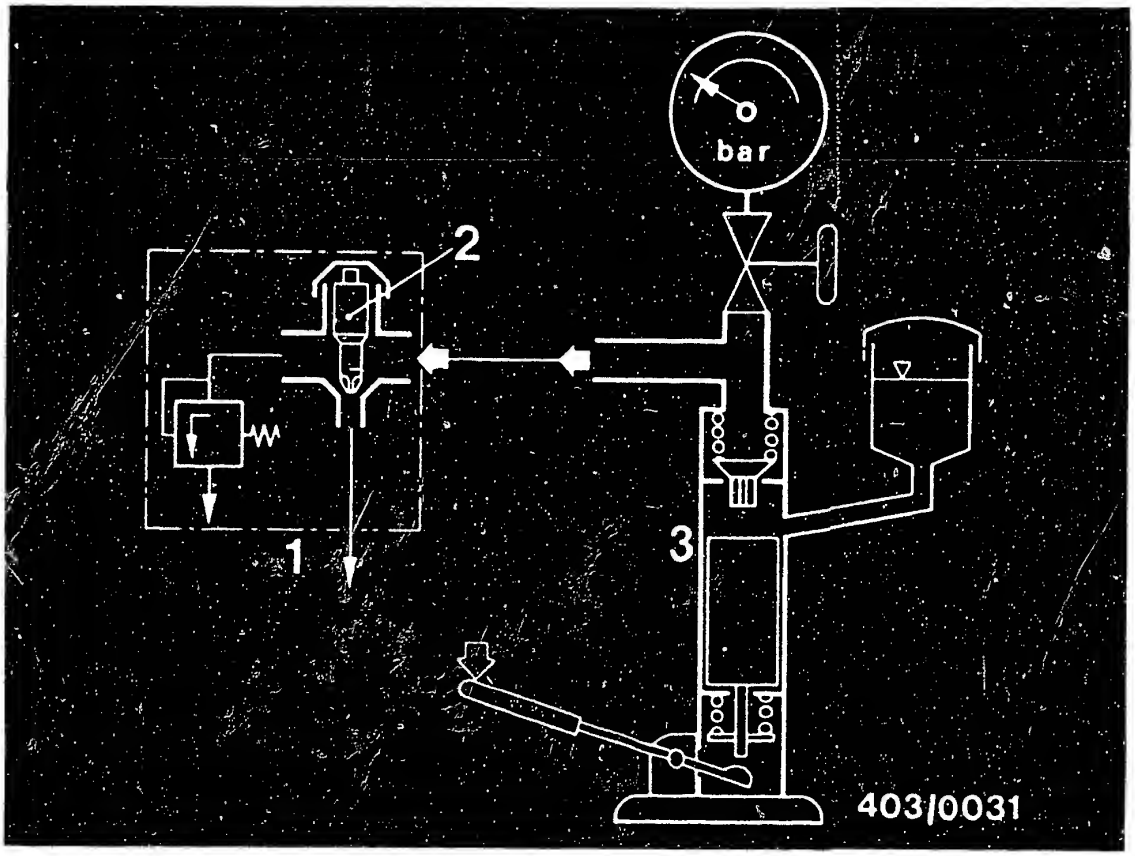
Until a high-pitched whistling tone is reached the spray is streaky and non-atomized. A split spray is of no significance at this point (chattering on the throttling stroke).
The spray pattern cannot be assessed until when the lever is being operated quickly (4...6 downward movements/second). The spray must then be concentrated and well atomized (chattering on the full stroke of the nozzle needle).



Test criteria for spray test

1 = Good injection nozzle.
Spray concentrated and well atomized

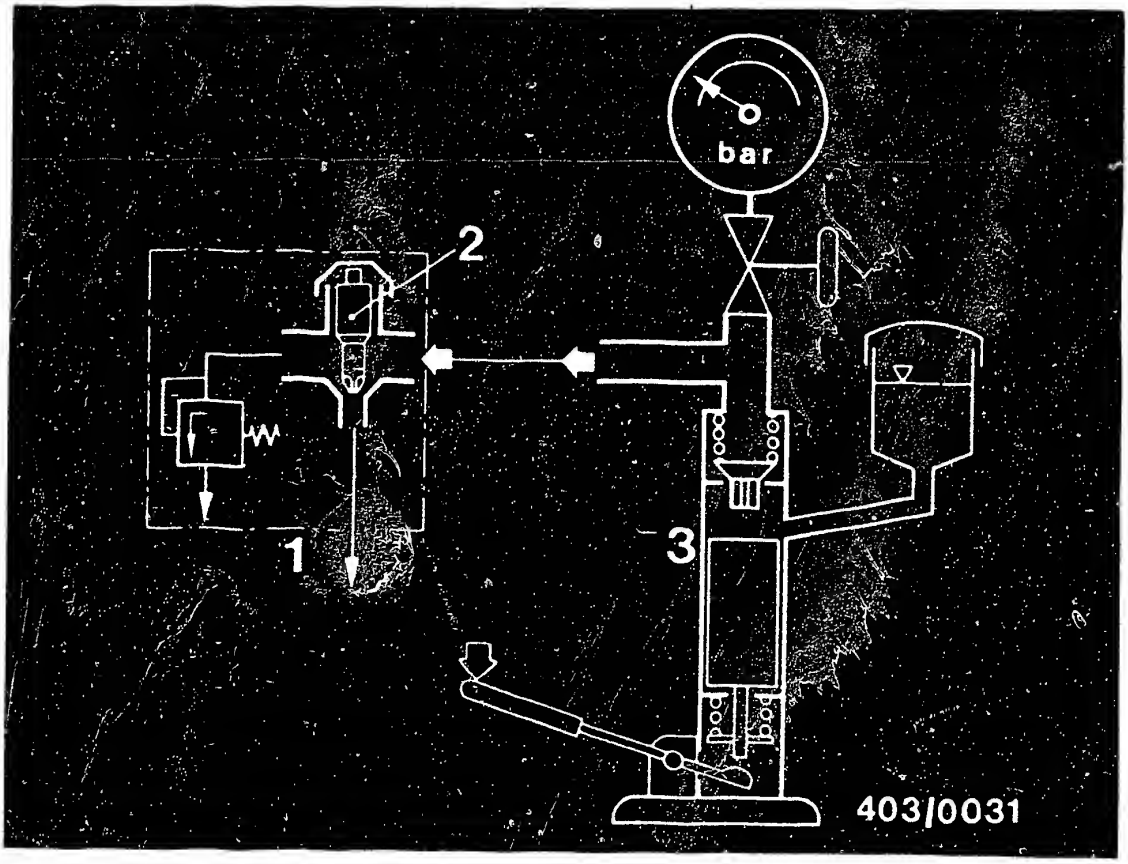
2 = Defective injection nozzle.
Spray too wide, streaky and not concentrated.



1 = DN test accessories 1 688 130 153 (overflow valve)
2 = Hole-type pintle nozzle (object under test)
3 = Nozzle tester 0 681 200 502 (EFEP 60 H)

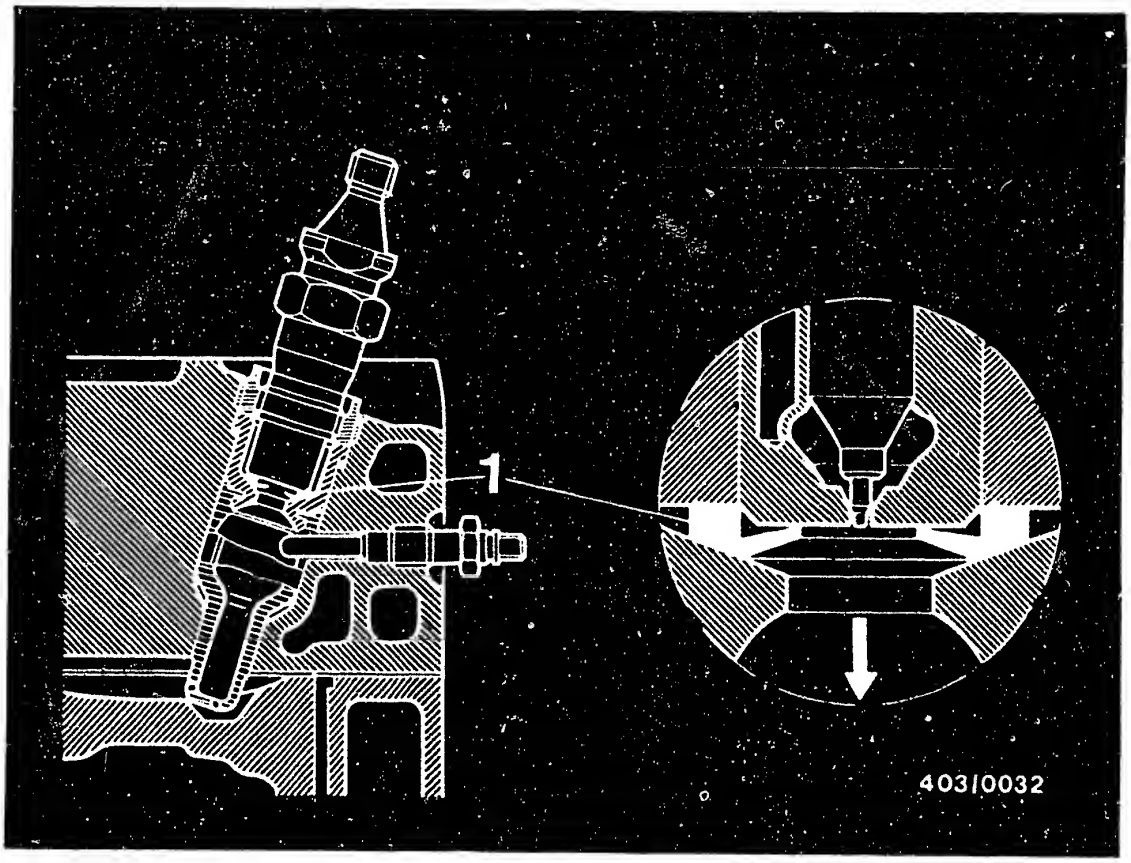
18.5 Testing the longitudinal bore in the nozzle needle

The needle tester 1 688 130 153 is required for this additional test.



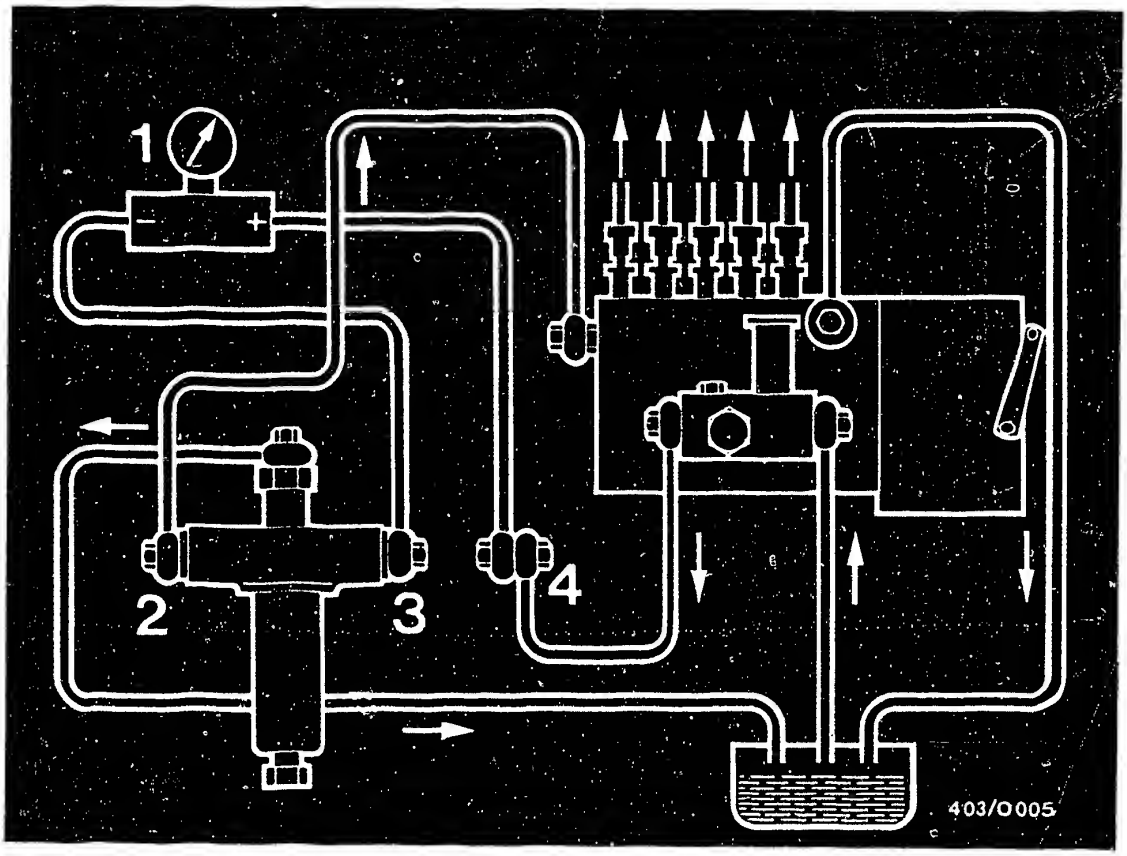
Test sequence

Remove the nozzle-and-holder assembly.
Introduce nozzle needle into needle tester 1 688 130 153 (1) and tighten clamping nut by hand.
Connect needle tester to nozzle tester and increase pressure until oil escapes from overflow valve.
When the lever continues to be moved uniformly and slowly (4...6 seconds for one downward movement of lever) a fine, clear axial spray must escape from the centre bore of the nozzle needle (arrow).



18.6 Fitting the injection nozzles

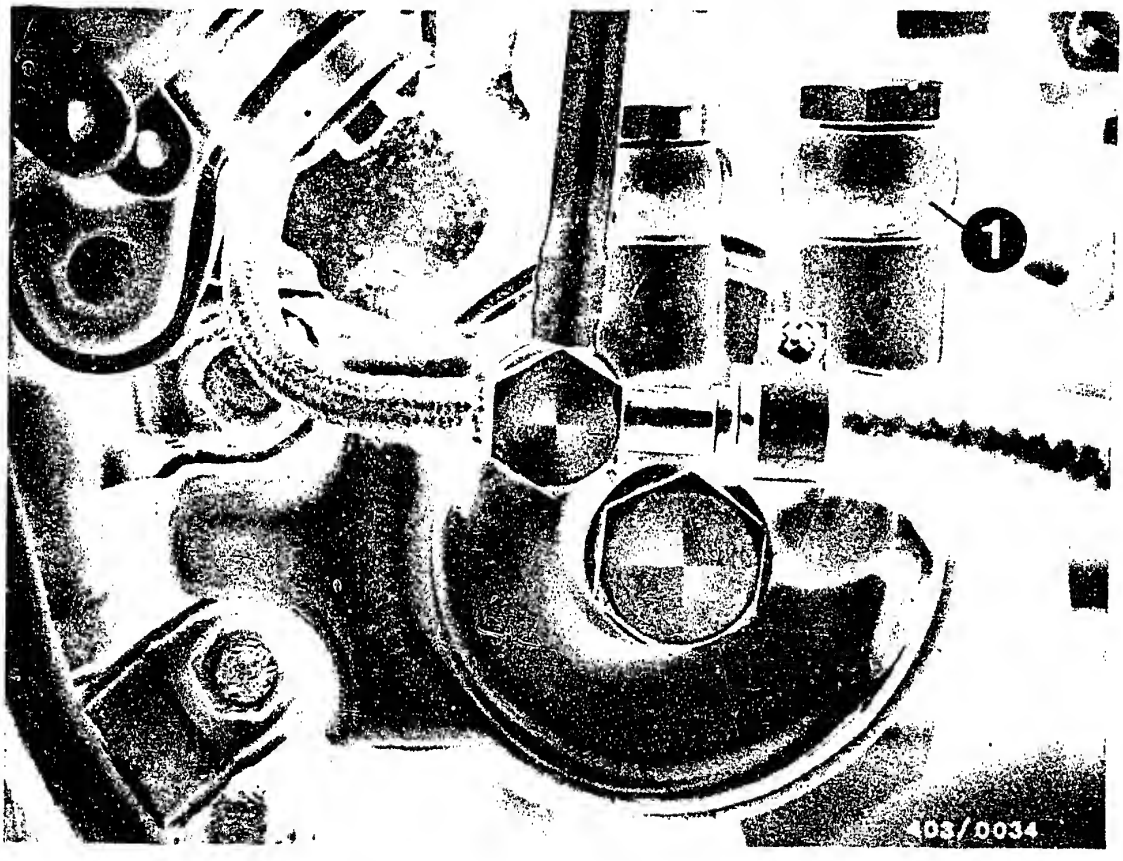
Before fitting the injection nozzles, fit a new heat seal (1) in the direction of the arrow with respect to the cylinder head.
Tighten fastening screws of nozzle holder to 70-80 Nm.
Tighten union nuts of fuel-injection tubing to 25 Nm.



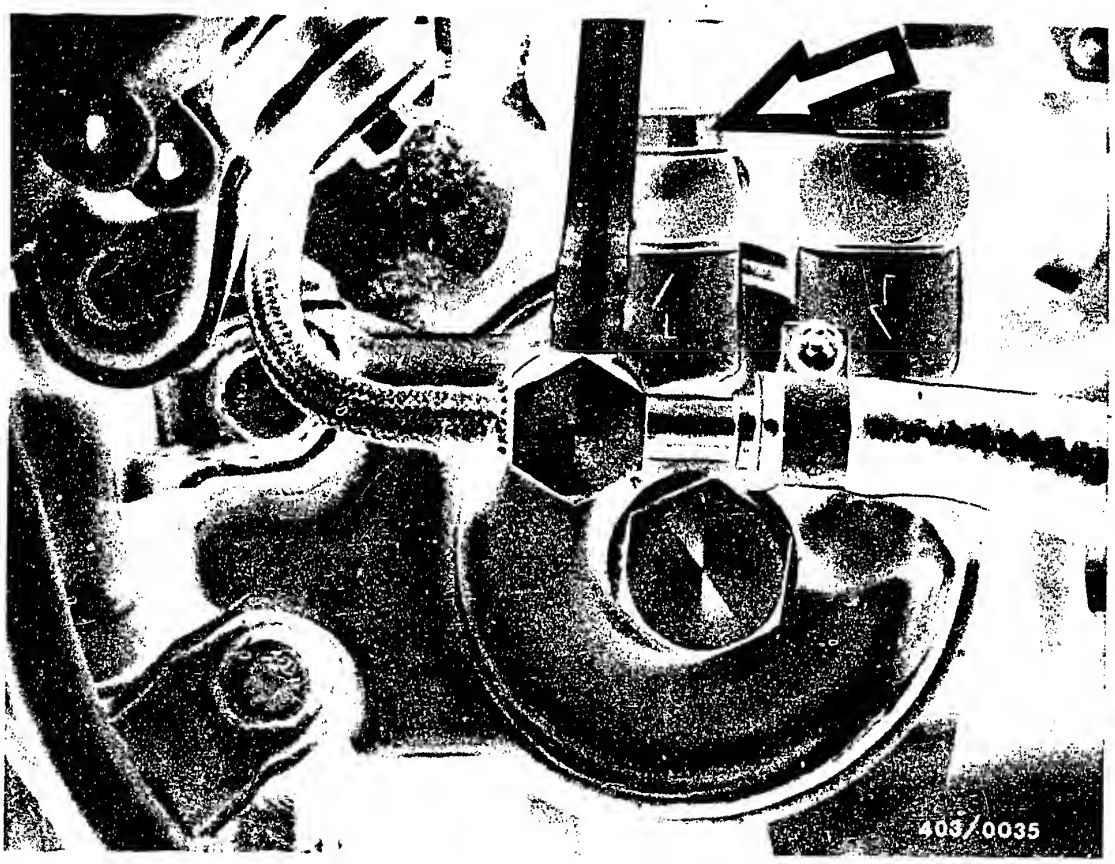
1 = Differential-pressure gauge
2 = Filter outlet (use inlet union and extra-long inlet-union screw 2443 456 020).
3 = Filter inlet (use inlet union and existing inlet-union screw on fuel filter).
4 = Double inlet-union screw with closing nut

19. Testing the fuel delivery pressure

Connect differential-pressure gauge to fuel filter using appropriate connecting pieces.



Unscrew fuel line (1) on main fuel filter.
Seal the (+) side of the differential-pressure gauge and the fuel line with a double inlet-union screw and closing nut.
Connect the (-) side of the differential-pressure gauge to the filter inlet.



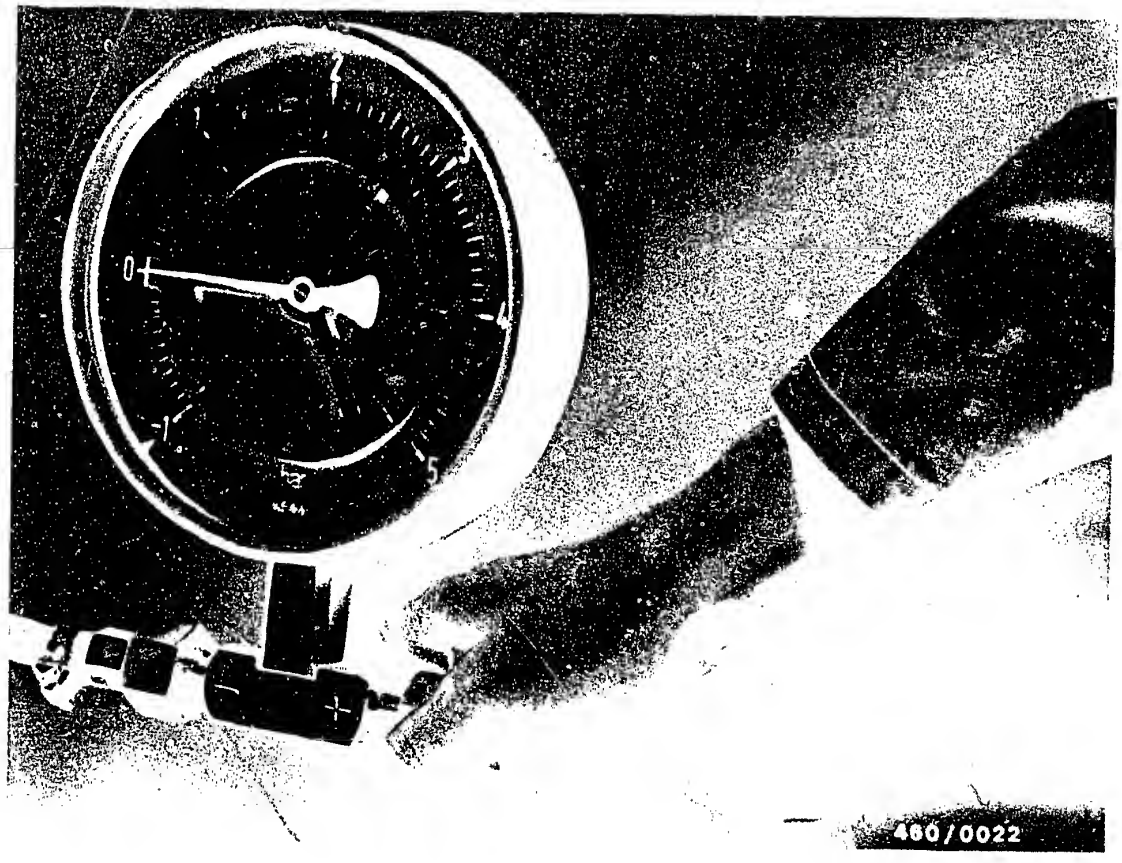
Fill up the fuel filter and injection pump with diesel fuel.

Loosen the inlet-union screw (arrow) on the fuel filter.

Loosen operating knob of hand primer and operate hand primer until the fuel escaping at the inlet-union screw is free of bubbles.

Re-tighten the inlet-union screw.

Using the hand primer, pump until the overflow valve on the injection pump opens (audible chattering noise). Tighten the operating knob on the hand primer.



Allow the engine to run until it has reached operating temperature (80°C coolant temperature).

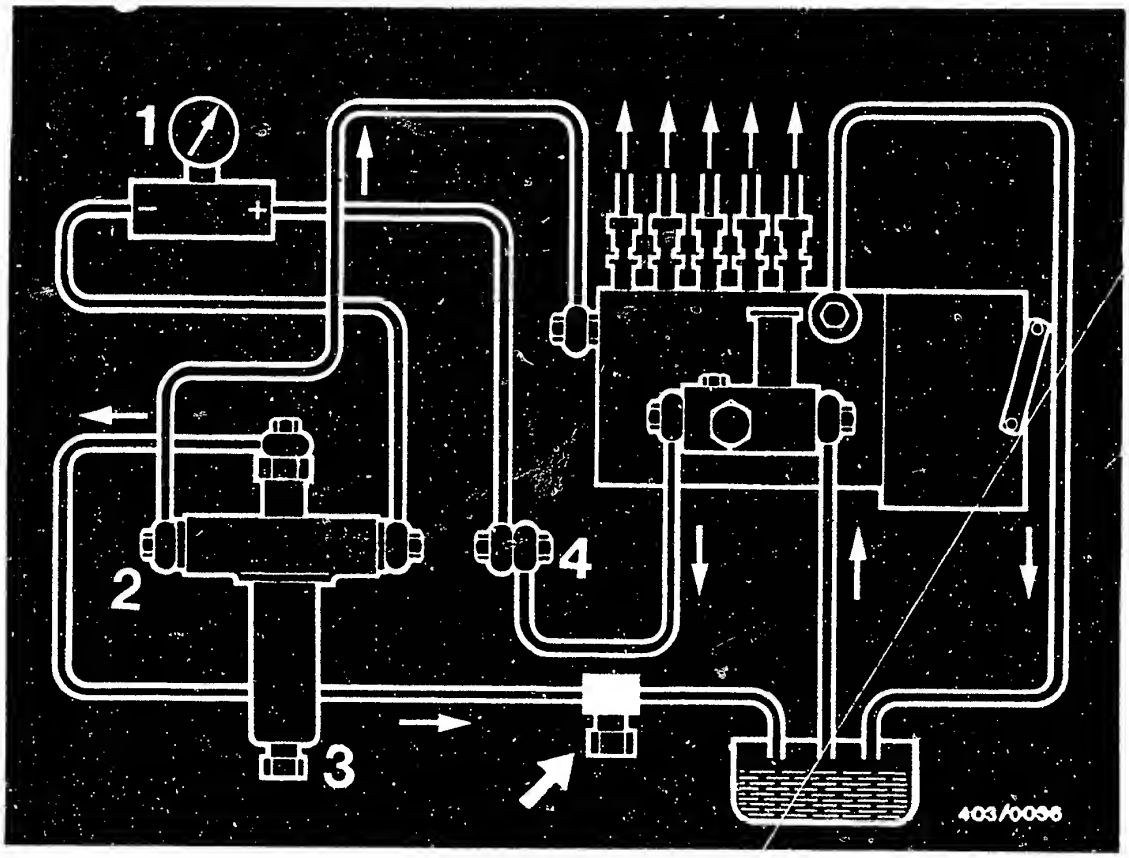
Measure the fuel delivery pressure at idle and at 3000 min-1.

At idle speed:	0.6...0.8 bar gauge pressure
At 3000 min^{-1}:	min. 0.8 bar gauge pressure

Read off these values on the black pointer.

If these values are not reached, check the following points:

- Remove, disassemble and clean the overflow valve on the injection pump.
- Check the fuel filter for fouling. If necessary, fit a new filter element with housing and seal.
- Replace the suction and delivery valves or replace the fuel pump.



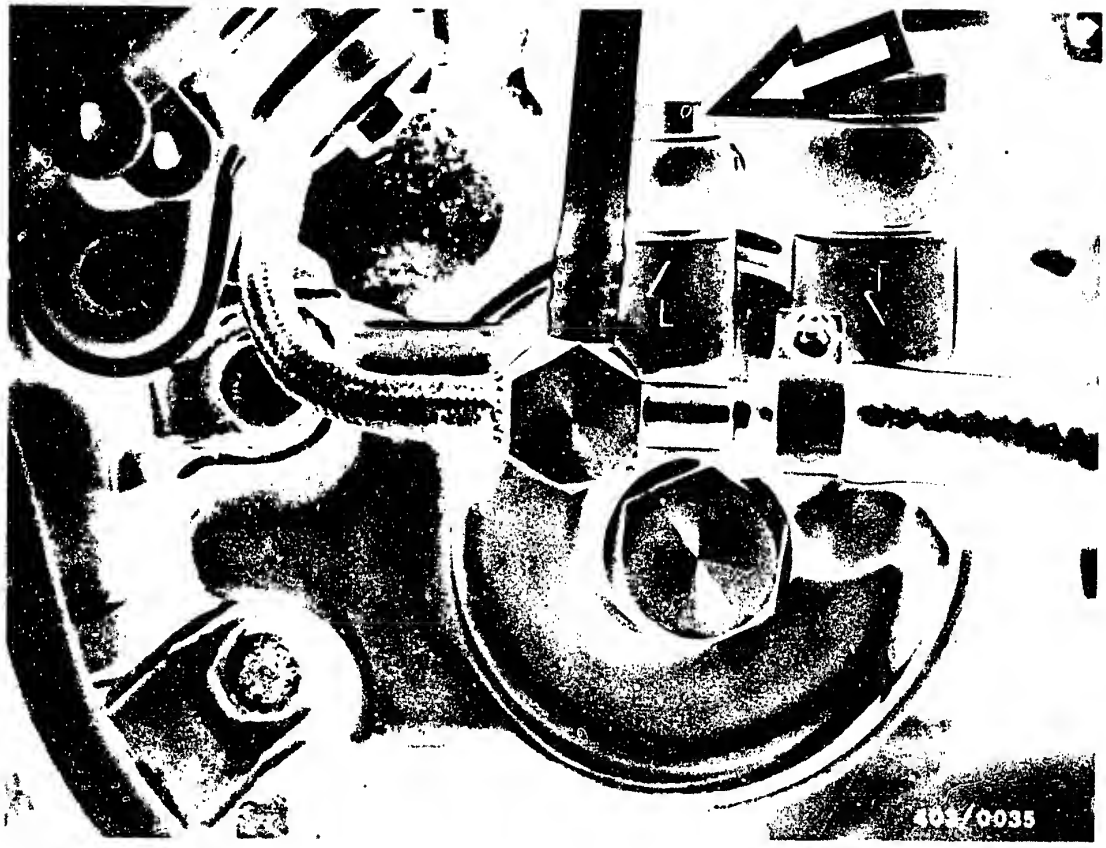
19.1 Testing the maximum fuel delivery pressure

Pinch off the fuel return hose with a clamp (arrow).

Measure the maximum fuel delivery pressure at idle and at 3000 min^{-1}.

At idle speed:	min. 1.1 bar gauge pressure
At 3000 min^{-1}:	min. 1.3 bar gauge pressure

If the maximum delivery pressure is too low:
Replace suction and delivery valves or replace fuel pump.
Remove differential-pressure gauge and connect fuel lines to fuel filter.



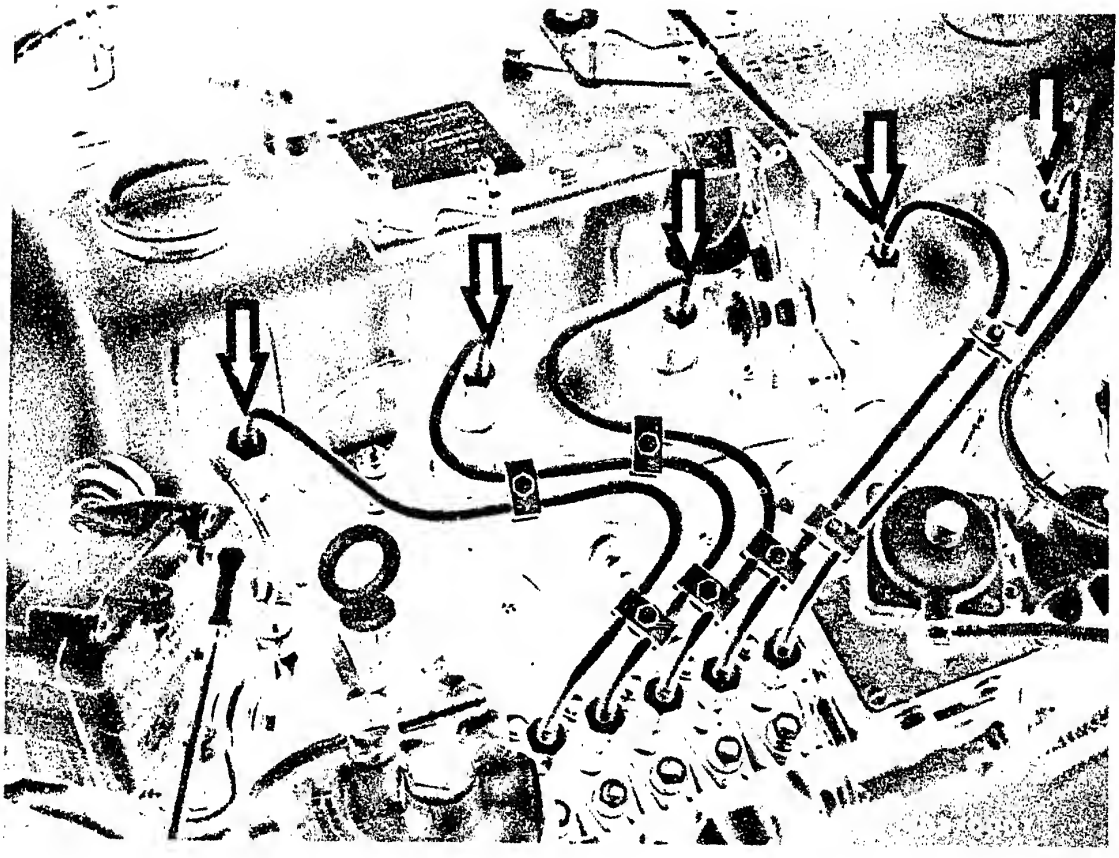
19.2 Bleeding the fuel system

Fill up the fuel filter and injection pump with diesel fuel.

Loosen the inlet-union screw (arrow) on the fuel filter.

Loosen the operating knob on the hand primer and operate the hand primer until the fuel escaping at the inlet-union screw is free of bubbles.

Re-tighten the inlet-union screw.



Loosen the union nuts of the fuel-injection tubing on the nozzle holders.

Operate the starting motor without pre-heating until fuel escapes at the union nuts of the nozzle holders.

Tighten the union nuts.

Operate starting motor until engine starts.

20. Checking the pre-heating system

Workshop information:

We recommend that the sheathed-element glow plug be replaced every 45 000 km.

In order to prevent irreparable damage to the glow-duration unit, the start repeater lamp must be fitted with a bulb with 12 V (max. 3 W).

For each repeat start the glow-plug and starter switch must (in order to obtain renewed pre-heating) first of all be turned to position 1 and then to position 2. This enables the safety cut-off circuit installed in the glow-duration unit to be re-activated.

Starting motor operates but engine fails to start or starts only with great difficulty

yes

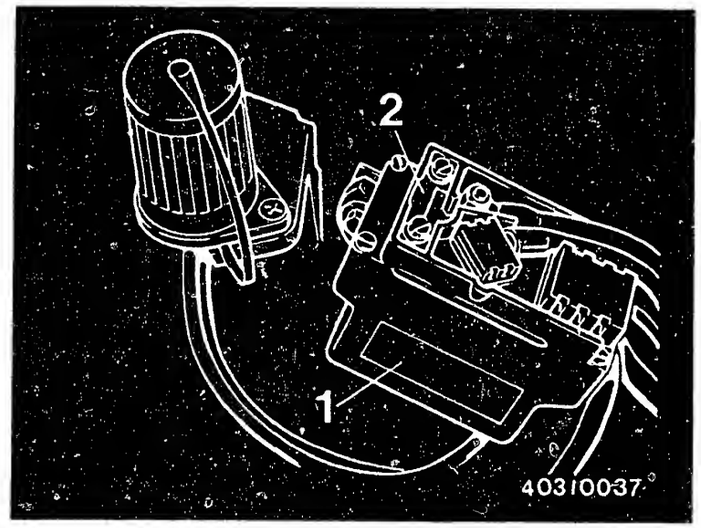
Test the power supply to the sheathed-element glow plugs.
Connect voltmeter to one sheathed-element glow-plug after the other and to ground.
Turn the glow-plug and starter switch to position 1 and then to position 2.
Voltmeter must indicate at least 10 V.
Caution:
After min. 21 seconds the system switches off automatically. If the measurement is to be repeated, the glow-plug and starter switch must first be turned back to position 1 and then to position 2.
Minimum voltage present?

No

Minimum voltage at all sheathed-element glow plugs not present.
1. Remove protective cap from glow-duration unit and check fuse strip (80 A). Replace if necessary.
2. Test lead from positive battery terminal to glow-duration unit term. 30 for open circuit. Eliminate open circuit.
3. Test for open circuit in lead from positive battery terminal through glow-plug and starter switch term. 15 to glow-duration unit term. 15. Eliminate open circuit.
4. Test for open circuit in ground lead from glow-duration unit term. 31. Eliminate open circuit.
If points 1-4 O.K., then replace glow-duration unit.
If the minimum voltage is not present at one or more sheathed-element glow plugs, test for open circuit in lead(s) from glow-duration unit term. G1...G5 to sheathed-element glow plug(s). Eliminate open circuit. If no open circuit, replace glow-duration unit.

Yes

Continued on E4/E5



1 = Glow-duration unit
2 = Fuse strip (80A)

Starting motor operates but engine fails to start or starts only with great difficulty

Yes

Test the start repeater lamp.
Turn glow-plug and starter switch to position 1 and then to position 2.
Start repeater lamp must light up.
Start repeater lamp lit?

no

1. Test for open circuit in lead from glow-duration unit term. La including start repeater lamp as well as its ground connection. Eliminate open circuit.
2. Test all sheathed-element glow plugs individually for open circuit.
Replace defective sheathed-element glow plug(s).
If point 1 and 2 O.K., replace glow-duration unit.

Yes

Test the pre-heating time.
Turn glow-plug and starter switch to position 1 and then to position 2. The pre-heating time (start repeater lamp lit) must be at an ambient temperature of

0°C approx. 6 seconds
+ 20°C approx. 4 seconds
+ 40°C approx. 2 seconds.

Preheating time (seconds) O.K.?

no

Replace glow-duration unit.

Yes

Continued on E6/E7

Starting motor operates but engine fails to start or starts only with great difficulty

Yes

Test the safety switch-off circuit. Connect voltmeter to a sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position 1 and then to position 2. At an ambient temperature of 0°C to +140°C the voltmeter may indicate voltage for a maximum of 40 seconds.
At the end of the specified time the voltmeter must indicate 0 V.
Voltmeter at 0 V after specified time?

no → Replace glow-duration unit.

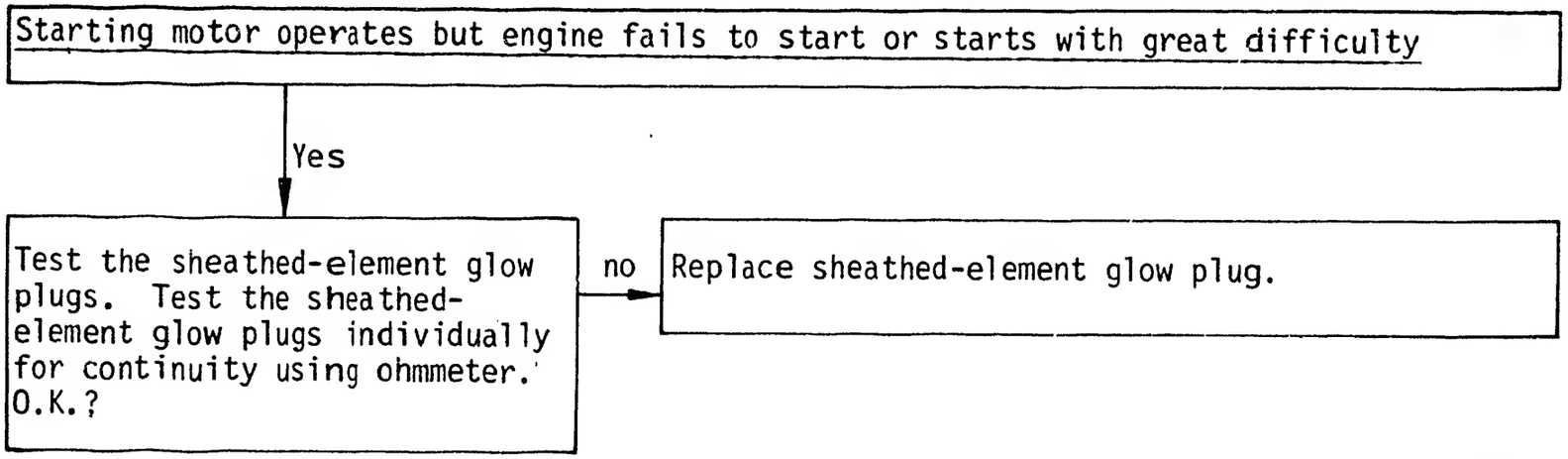
Yes

Test the pre-heating when the starting motor is operated. Connect voltmeter to a sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position 3 (operate starting motor). Voltmeter must indicate a voltage from 6...10 V.
Voltage present?

no →
1. Test for open circuit in lead from glow-plug and starter switch term. 50 to glow-duration unit term. 50. Eliminate open circuit.
2. If point 1 O.K., replace glow-duration unit.

Yes

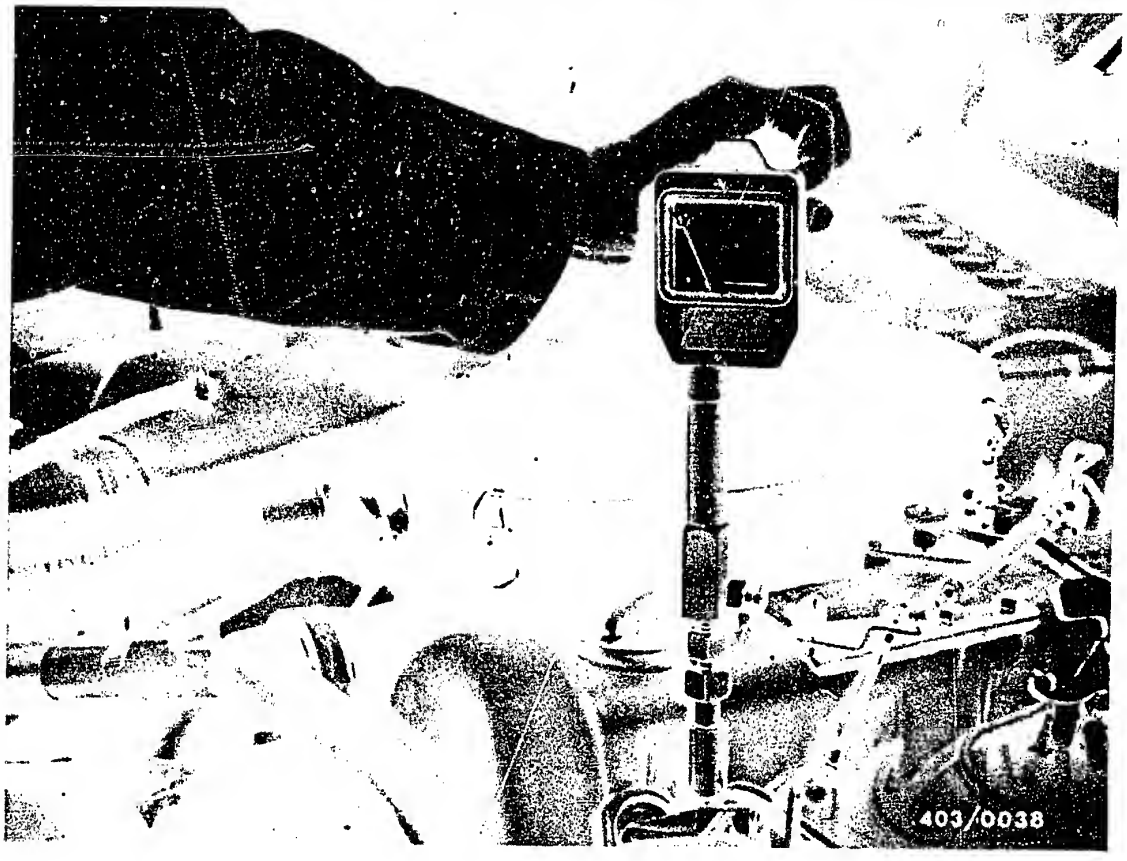
Continued on E8/E9


Starting motor operates but engine fails to start or starts with great difficulty
Yes
Test the sheathed-element glow plugs. Test the sheathed-element glow plugs individually for continuity using ohmmeter. O.K.?
no
Replace sheathed-element glow plug.

21. Measuring the engine compression and compression loss

21.1 Measuring the engine compression

Fit new chart in compression tracer.
Mount high-pressure hose on tracer.
Switch off engine.



Depending on the connecting nipple of the compression tester, unscrew the nozzle holder.
Using the starting motor, turn over the engine several times so that loose deposits are removed from the compression space.
Screw in connecting nipple.
Fit high-pressure hose of compression tester onto connecting nipple.

During the following operation, note the first compression stroke.

Operate starting motor until there is no longer a detectable rise in pressure on the compression tracer.

Bleed compression tracer by pressing on bleeder valve.

The pointer returns to the starting position.

Move chart onto next position.

Fit connecting nipple to the other cylinders and repeat measurement.

21.2 Evaluation of chart

1. Normal pressure rise

If p. ton rings and valves are in good condition, the first compression stroke shows the highest pressure increase. During the following compression strokes the compression builds up to the maximum pressure.

2. Gradual pressure rise

If, from the start, the compression increases only gradually on each piston stroke, this points to burnt valve seats or defective valve guides.

3. Low maximum pressure

If the maximum compression obtained is too low on all cylinders, this points to defective pistons, piston rings or valves.
If the compression is too low on two neighbouring cylinders, this points to a leaky cylinder head gasket.

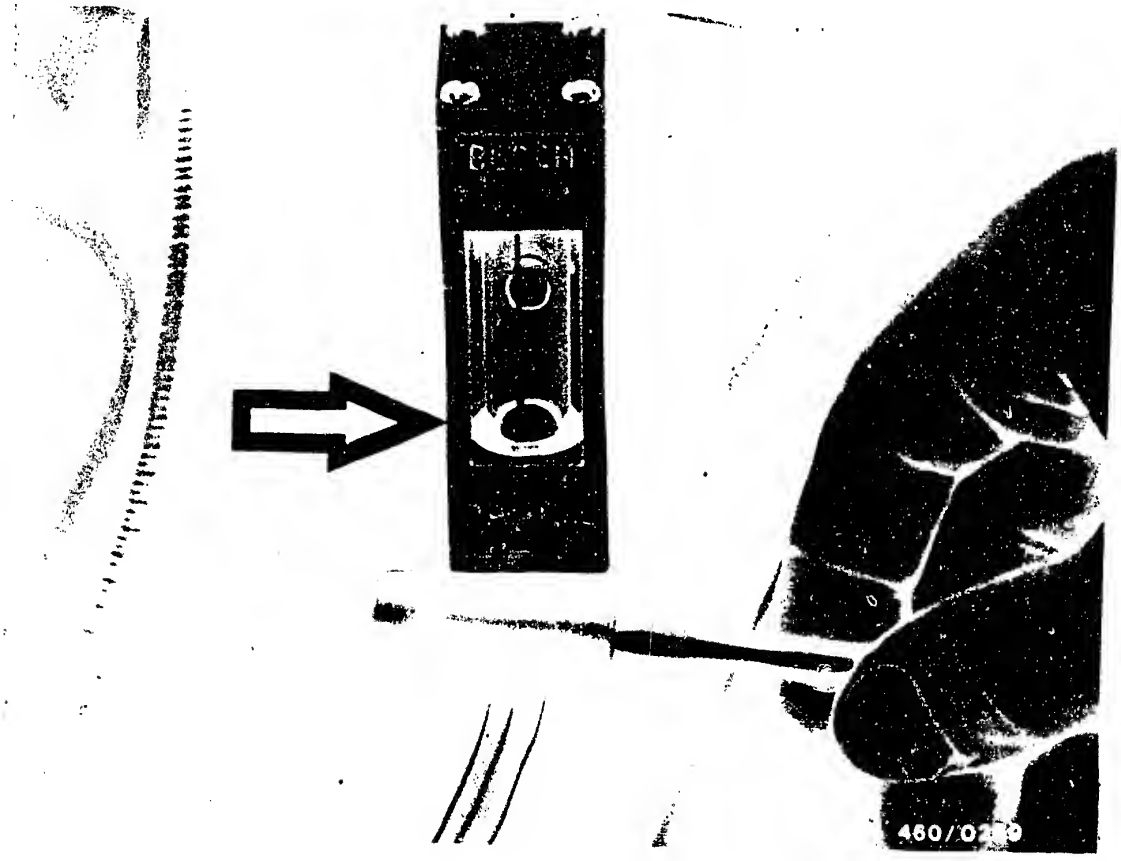
4. Varying compression

If one cylinder shows a clearly lower compression, proceed as follows: Fill in 2 - 3 cm^3 of engine oil through the opening of the sheathed-element glow plug or nozzle holder and operate starting motor briefly.

Repeat measurements and compare charts. If there is a clear increase in compression during the second test, then the piston rings or cylinders are worn.
If there is no change in the result, then defective valves are the cause.

5. Uniform compression

Uniform compression is extremely important with regard to the smooth running of the engine. Maximum compression is, therefore, not the only objective.



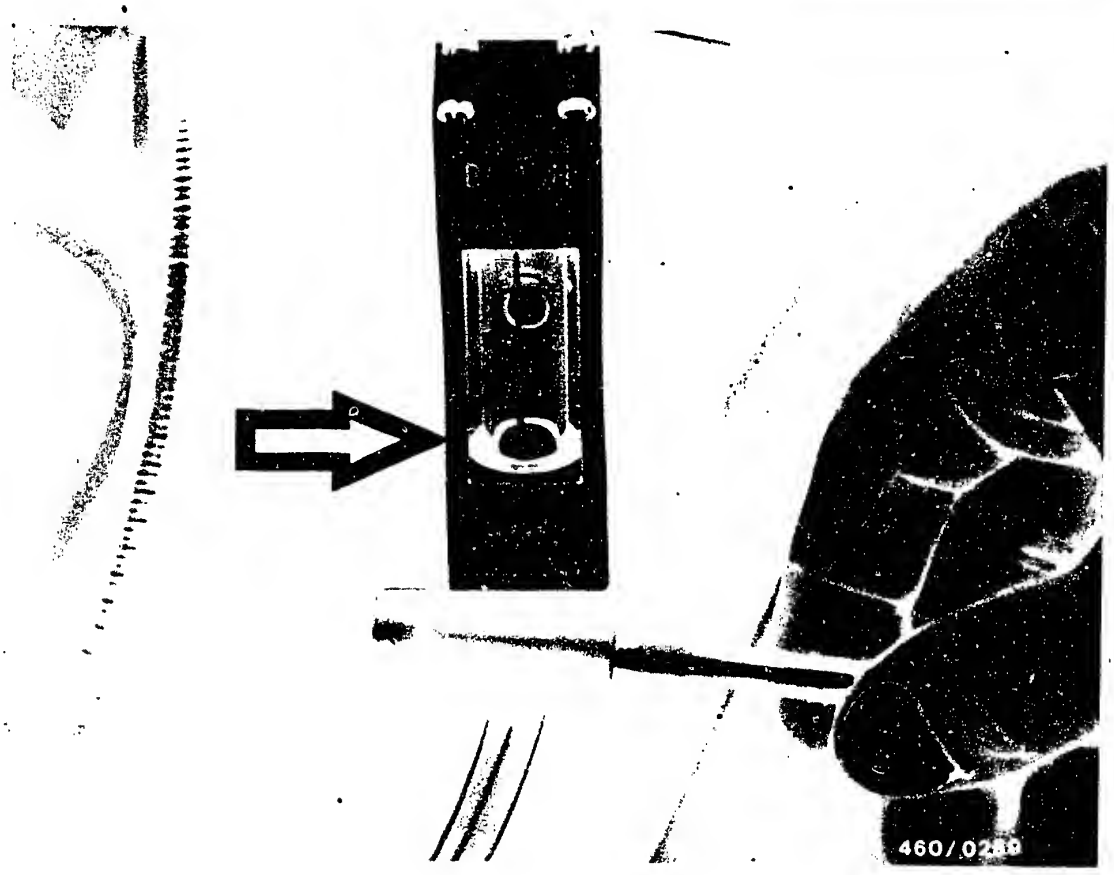
21.3 Measuring the compression loss of the engine

The test is performed using the BOSCH compression-loss tester 0 681 001 901 (EFAW 210 A).

For testing, the respective piston must be at TDC (TDC = top dead centre) on the compression stroke.

For setting this position, use DC detector 1 688 132 025 (included in accessories with compression-loss tester).

Perform test with engine at normal operating temperature (temperature of water approx. 80°C).



21.4 Setting top dead centre

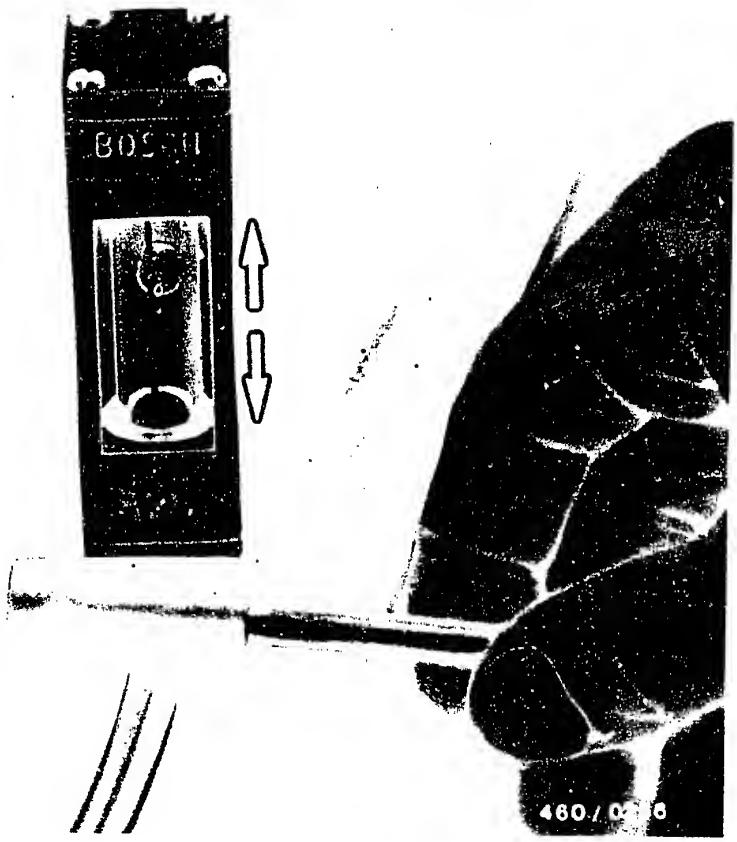
Remove sheathed-element glow plug from cylinder 1.

Insert rubber plug of DC detector into bore for sheathed-element glow plug.

Using magnetic clamp, mount glass cylinder in as vertical a position as possible in the engine compartment.

The piston of the unit must be easily visible.

Slowly turn the engine over by hand in its direction of rotation.



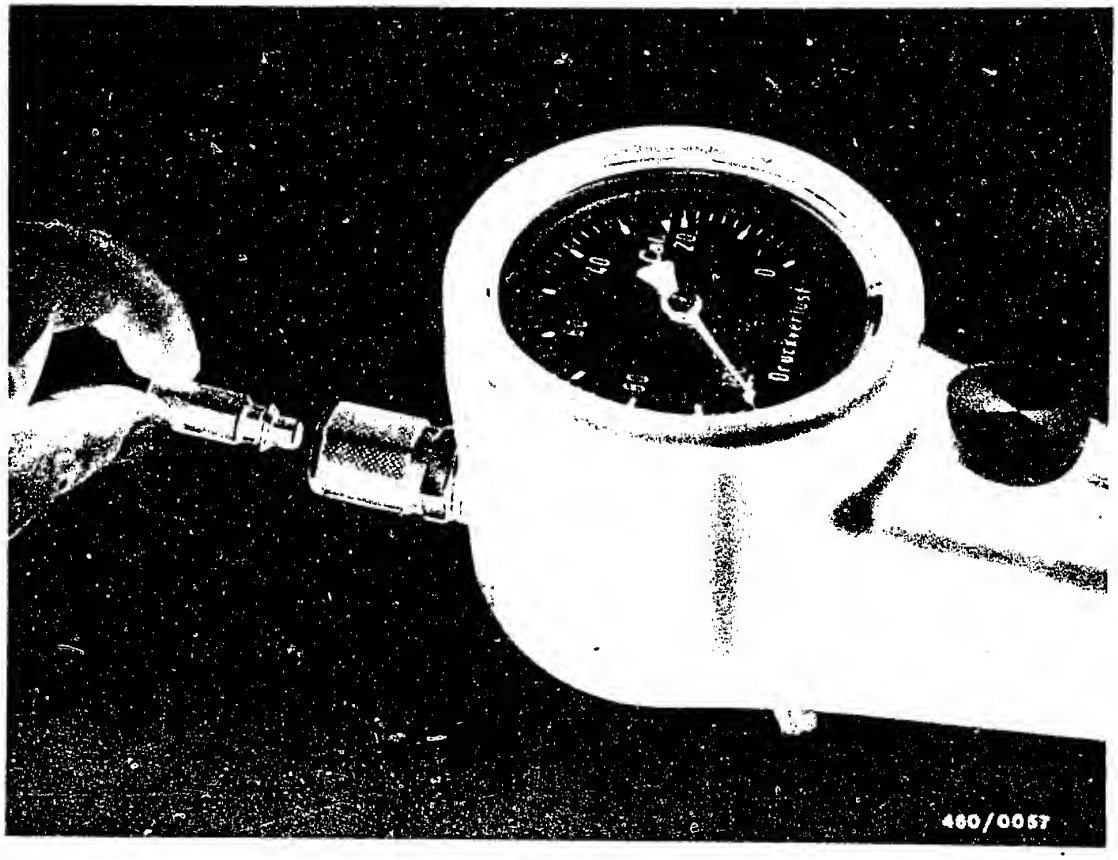
On the compression stroke, the piston of the DC detector is forced upwards.

As top dead centre is passed over, the piston slides down again immediately.

Locate top dead centre by carefully turning the engine backwards and forwards.

Note:

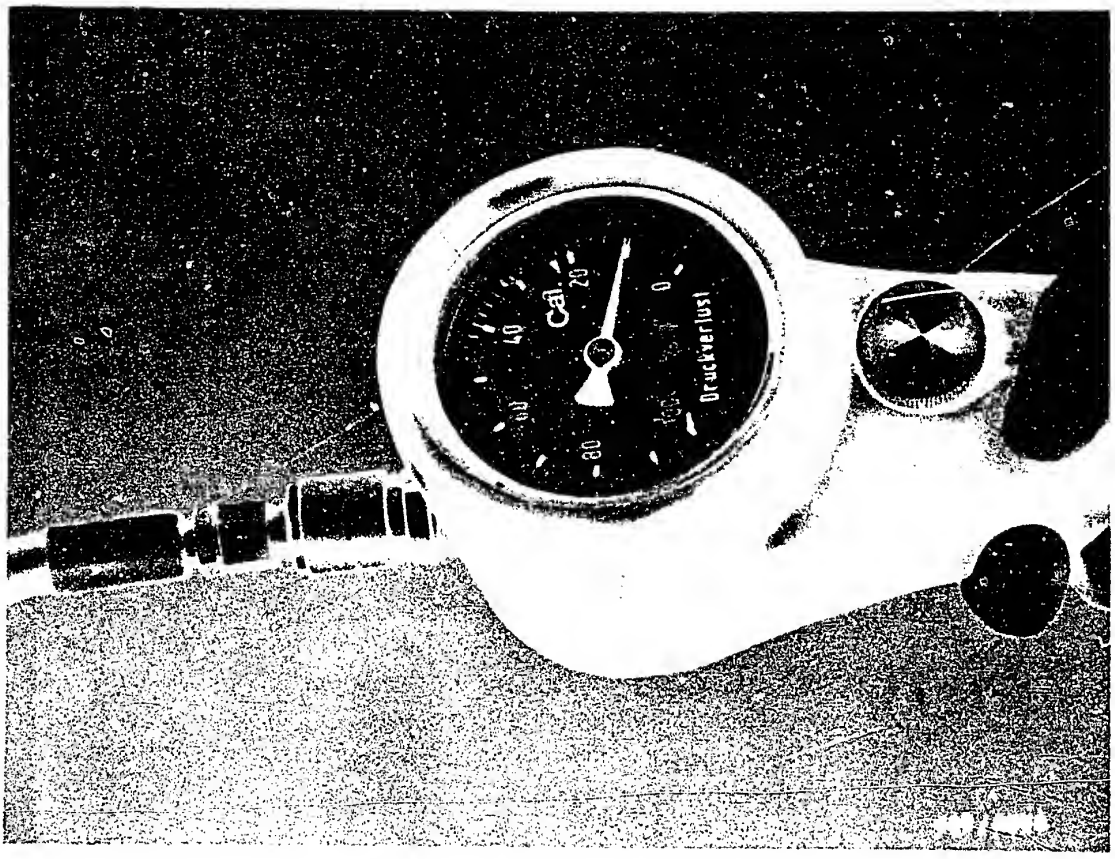
The TDC mark serves as reference point (left-hand picture, arrow).



21.5 Measuring compression loss

Connect tester to compressed-air mains.
Connect calibrating nozzle 1 680 363 036. Set a compression loss of 23 + 1% (marking "Cal") at the knurled thumbscrew on the pressure-regulating valve.
Disconnect calibrating nozzle.
Instrument indicator must show approximately 0% compression loss (equipment check).

Remove sheathed-element glow plug.



Screw in fitting and mount test hose.

Select gear and pull on handbrake.
Connect test hose to tester.
Read off compression loss in % on instrument.

Note

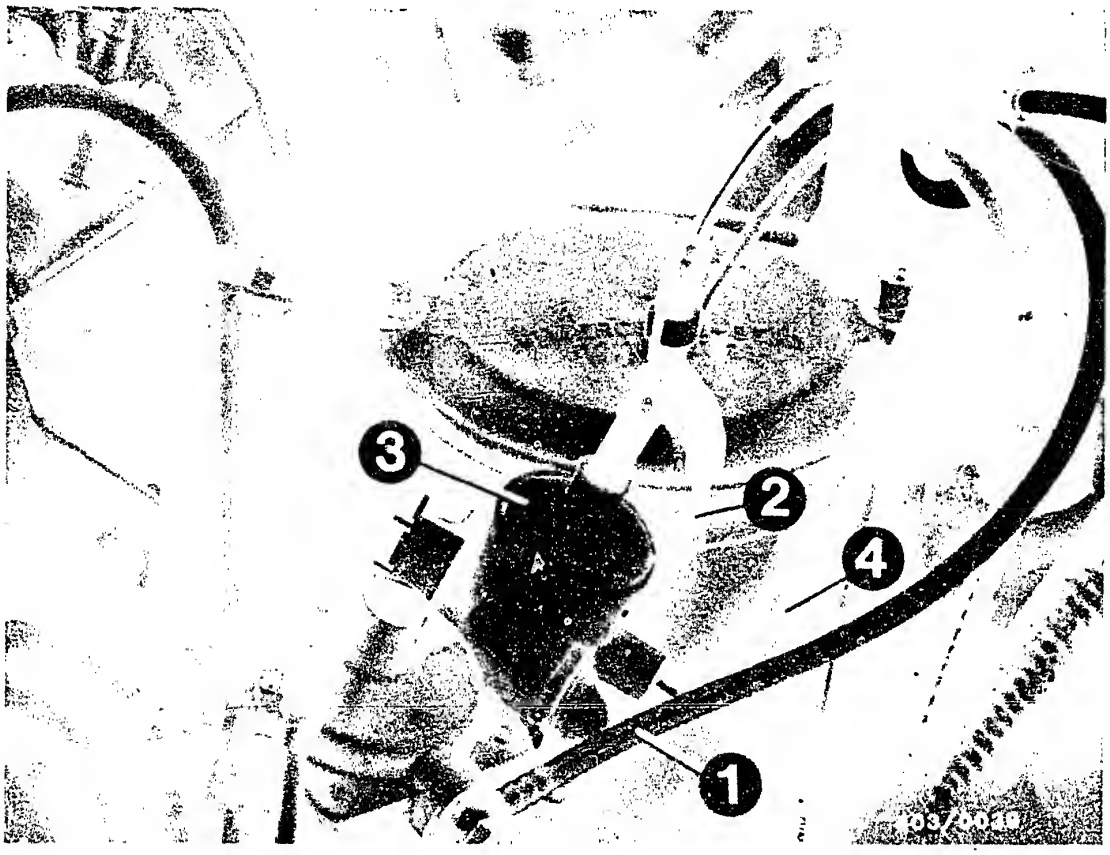
Before testing next cylinder, turn the engine over briefly without pre-heating using the starting motor so that the oil film re-forms.

21.6 Evaluation of test

The compression loss indicated should not exceed 25%. Differences of 10% between the individual cylinders can be ignored.
The causes of greater losses can be located because the air makes a noise as it escapes.
Listen at the following points:

Location of noise	Possible trouble
Charge air tube (remove air filter)	Intake valve
Exhaust manifold	Exhaust valve
Oil filler neck on engine	Pistons, piston rings
Cooling water filler neck (air bubbles)	Cylinder head gasket

In order to trace the trouble even more accurately, fill approximately 2-3 cm^3 of engine oil into the cylinder. Repeat test.
If there is a clear decrease in compression loss during this test, then the fault lies with the piston or with the piston rings.
New engines which have not yet been run in (less than 5000 km) may show higher compression losses than after the running-in period.



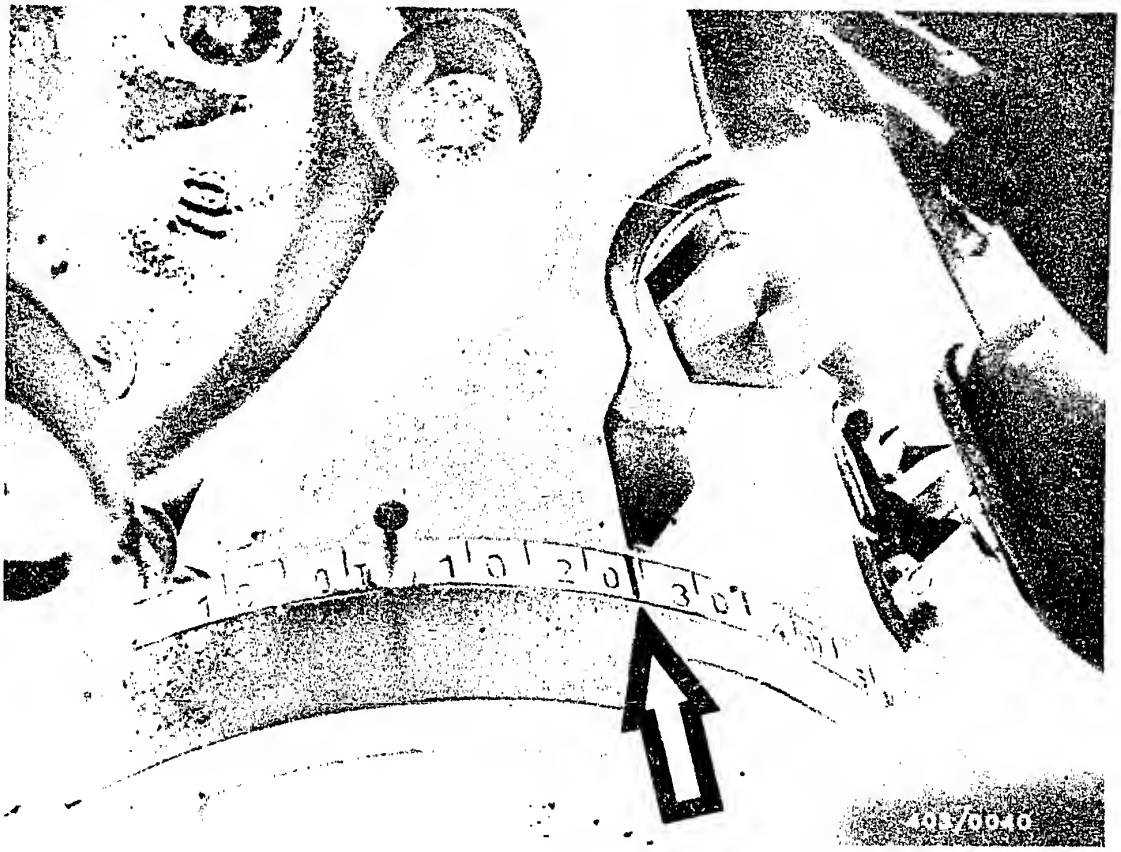
22. Work on the fuel-injection pump

22.1 Removing the fuel-injection pump

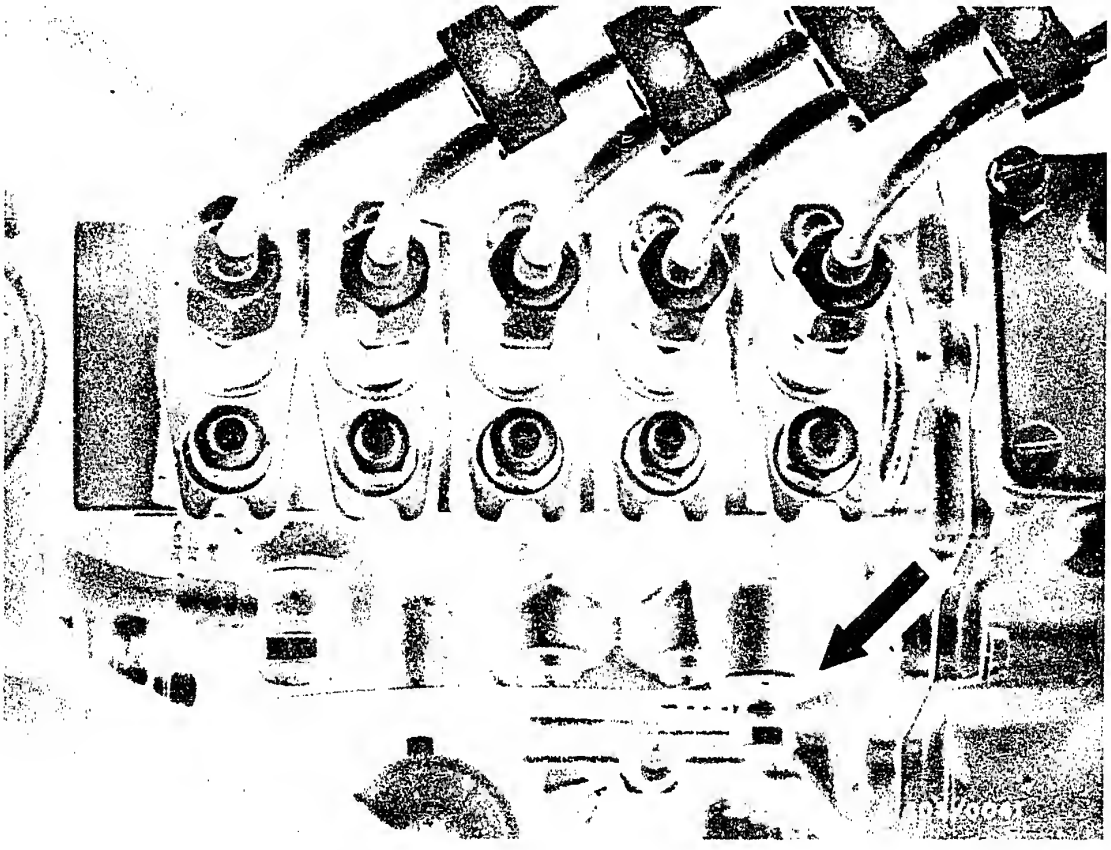
Disconnect the positive terminal of the battery.

Remove the vacuum line (2) from the vacuum unit and from the vacuum-control valve (3) for automatic transmission.

Unscrew the charge-air pressure line (1) from the ALDA box. Remove electric cable from temperature sensor (4). Unhook the control linkage. Unscrew fuel-injection tubing and fuel lines from the injection pump.

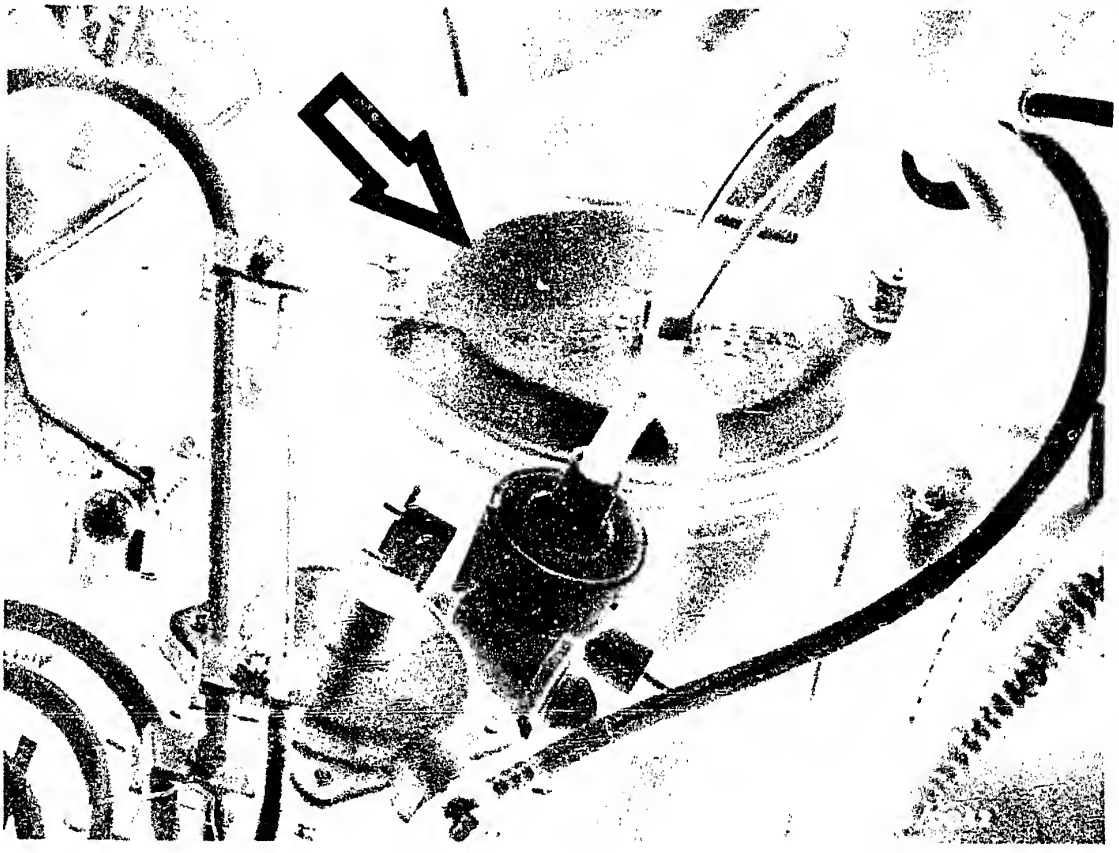


Turn the crankshaft in the direction of rotation of the engine until cylinder 1 is at 24° before TDC on the compression stroke.

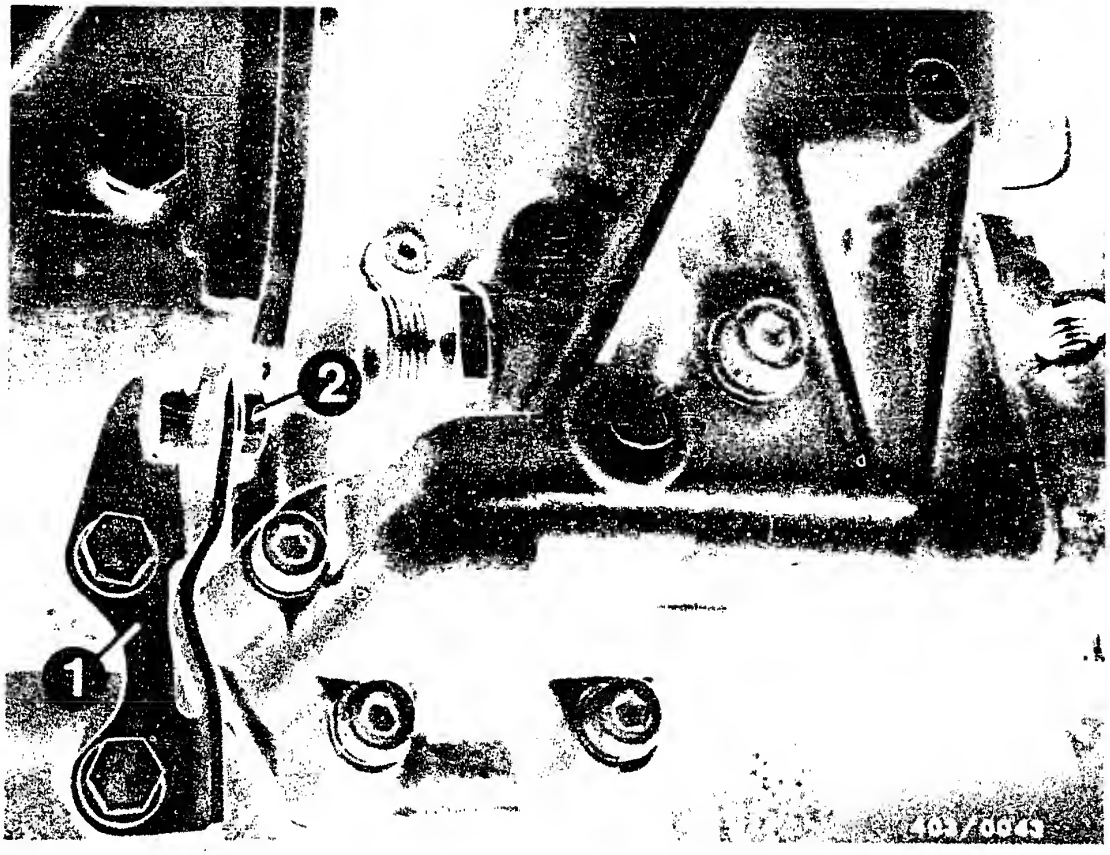


Unscrew the lubricating-oil line (arrow).

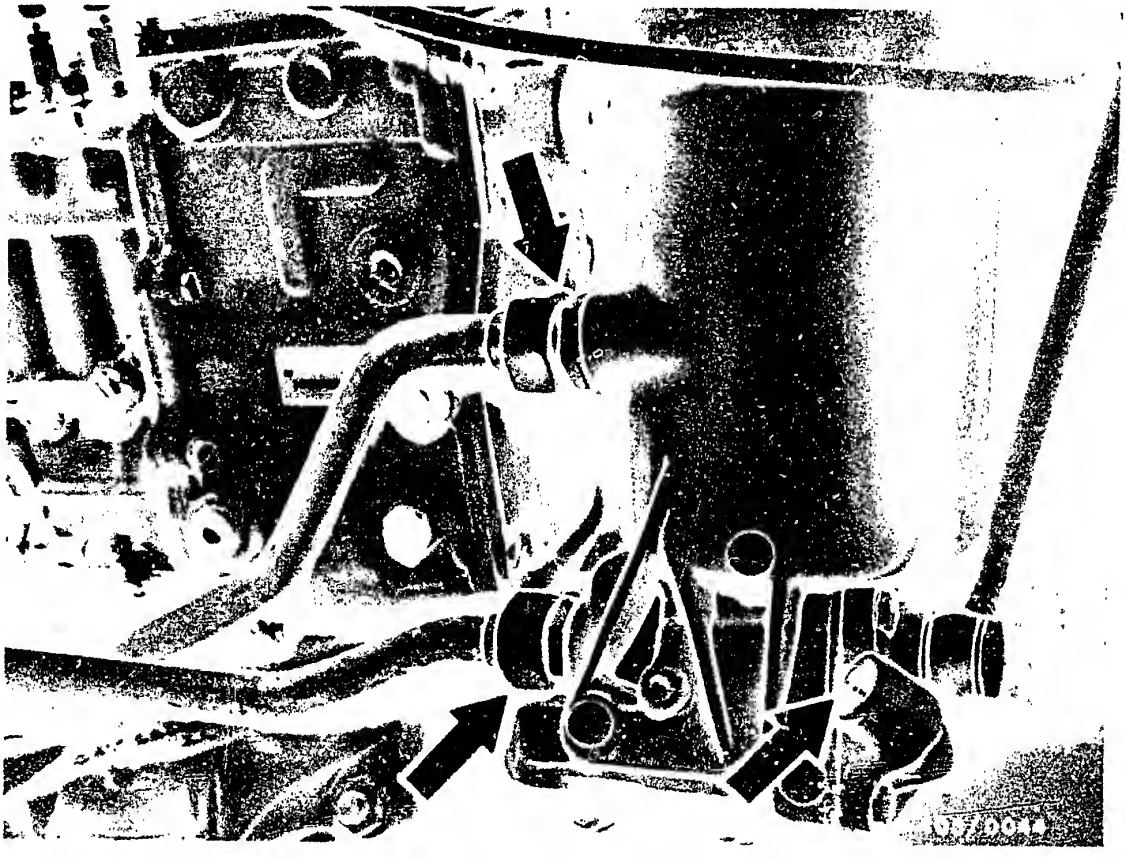
Caution
Before removing the lubricating-oil line, clean the joints.



Unscrew the top part of the oil filter (arrow) and take out filter element so that the engine oil can flow back into the oil pan.



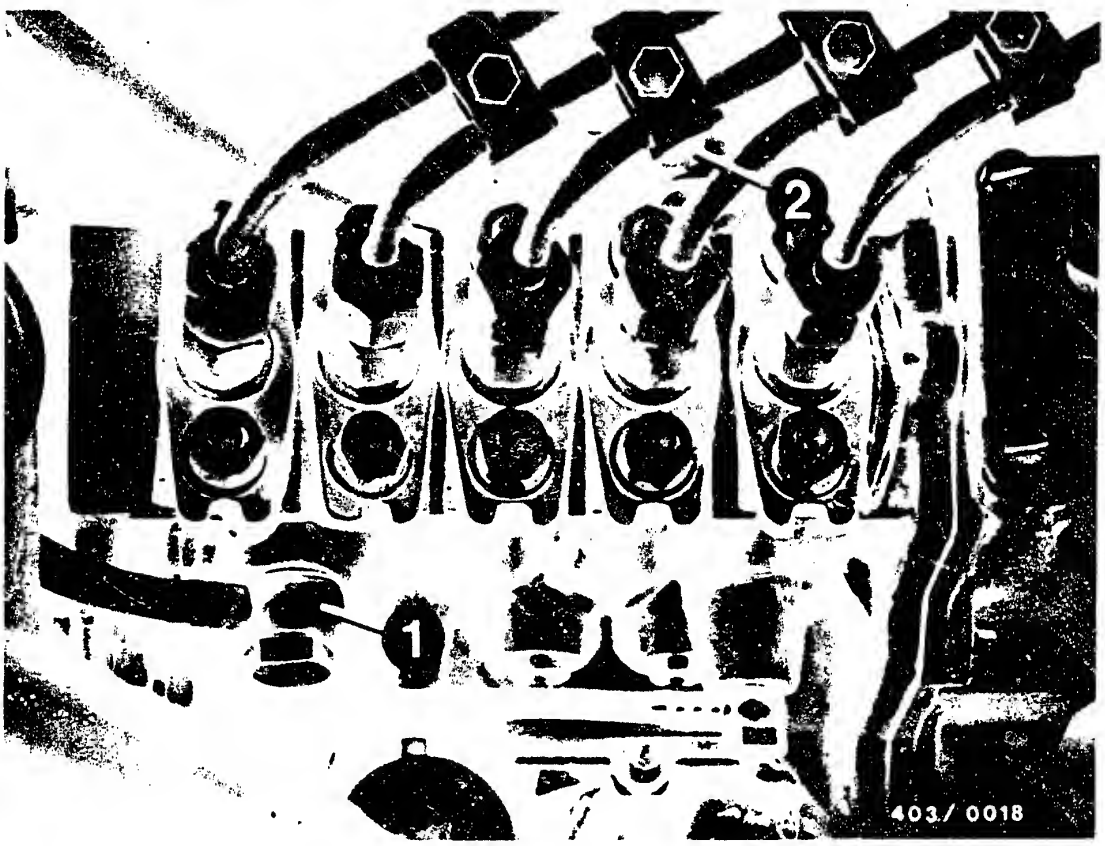
Unscrew hexagon nuts on support bracket (1) and unscrew the 3 fastening nuts of the injection pump. Loosen fastening screw (2) so that it is possible to move along the slot.



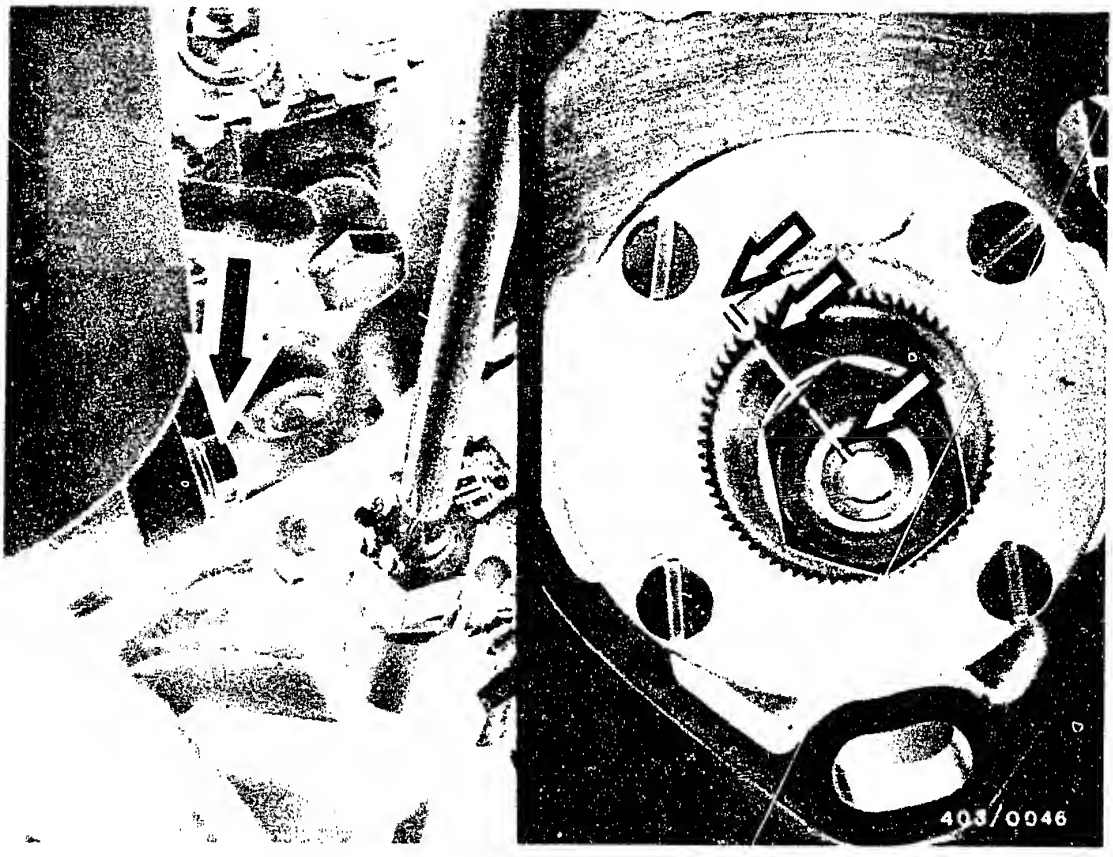
Unscrew all engine-oil lubricating lines from the oil filter.
Unscrew the oil-filter housing at the crankcase and remove it.

Caution

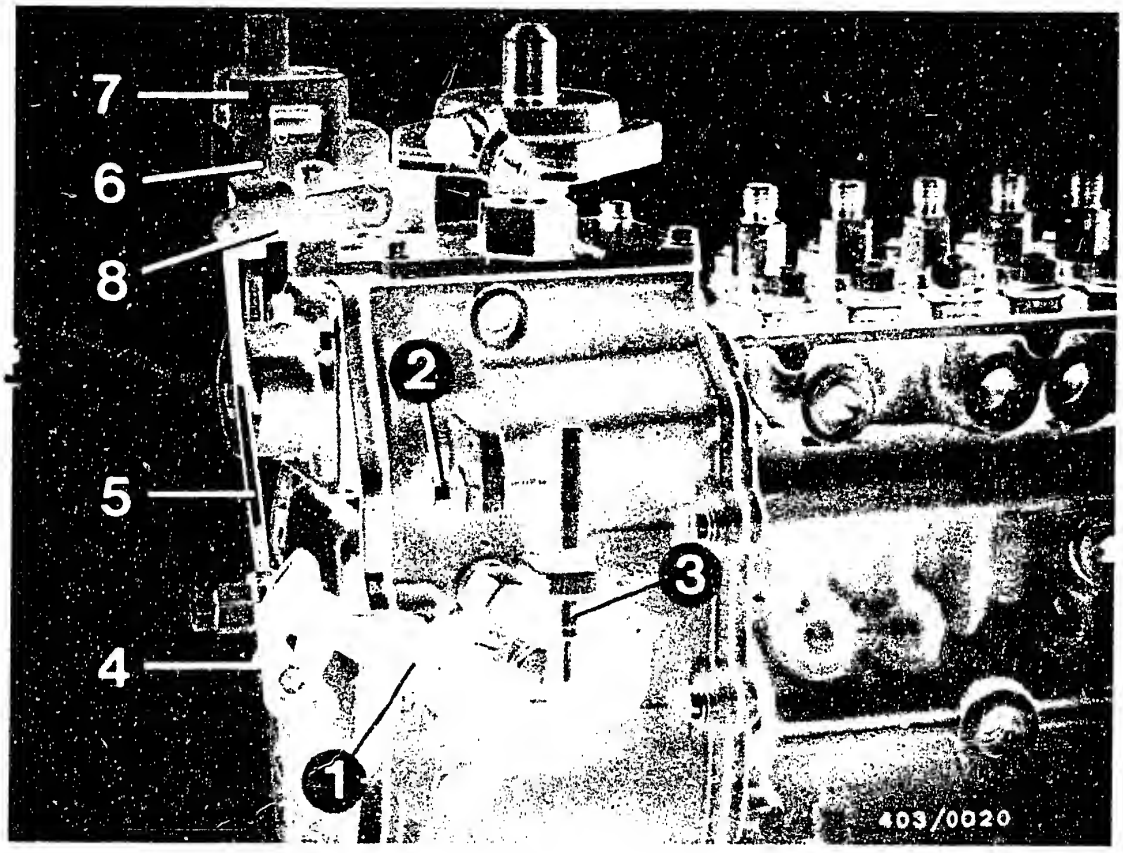
When taking off the seal ring, ensure that remnants do NOT fall into the oil bores.



Unscrew fuel inlet line (1) and fuel return line (2) of injection pump.
Undo fuel-injection tubing (3) with open box wrench. Unhook pressure rod from reguiating lever of injection pump.



Loosen fastening screws of injection pump (arrow).
Withdraw injection pump from the cylinder block and crankcase (Fig. a).
Remove coupling sleeve from driver of injection pump or from drive shaft.
Note:
When replacing a driver, hold it using a serrated wrench in order to loosen the hexagon nut. Remove driver from the injection-pump shaft using KDEP 1131. Clean the shaft end and the driver; both cones must be clean and free from grease.
Fasten the driver with Woodruff key and hexagon nut.
Pay attention to the Woodruff key when fitting a new driver (Fig. b).
The marks on the camshaft, driver and flange must be in alignment (arrows).



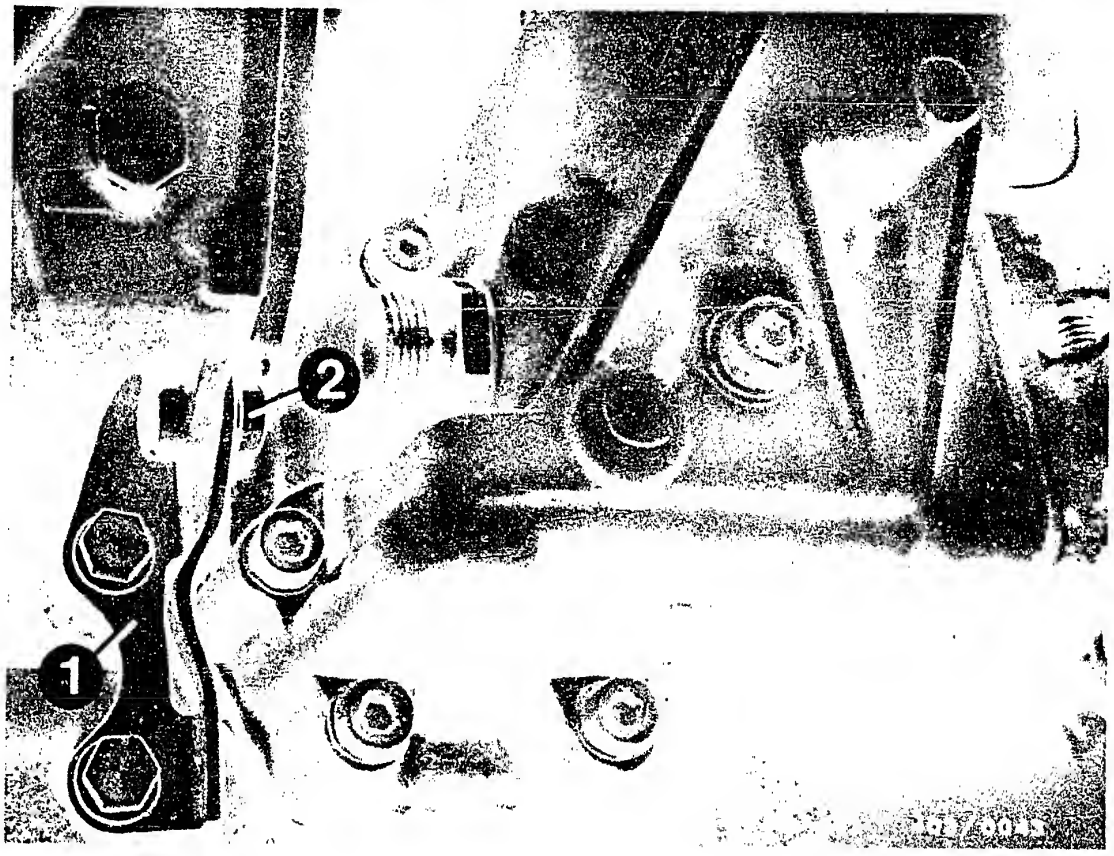
1 = Regulating lever
2 = Full-load stop
4 = Adjustable ball head
5 = Connecting rod
6 = Full-load stop on vacuum-control valve

22.2 Installing the fuel-injection pump

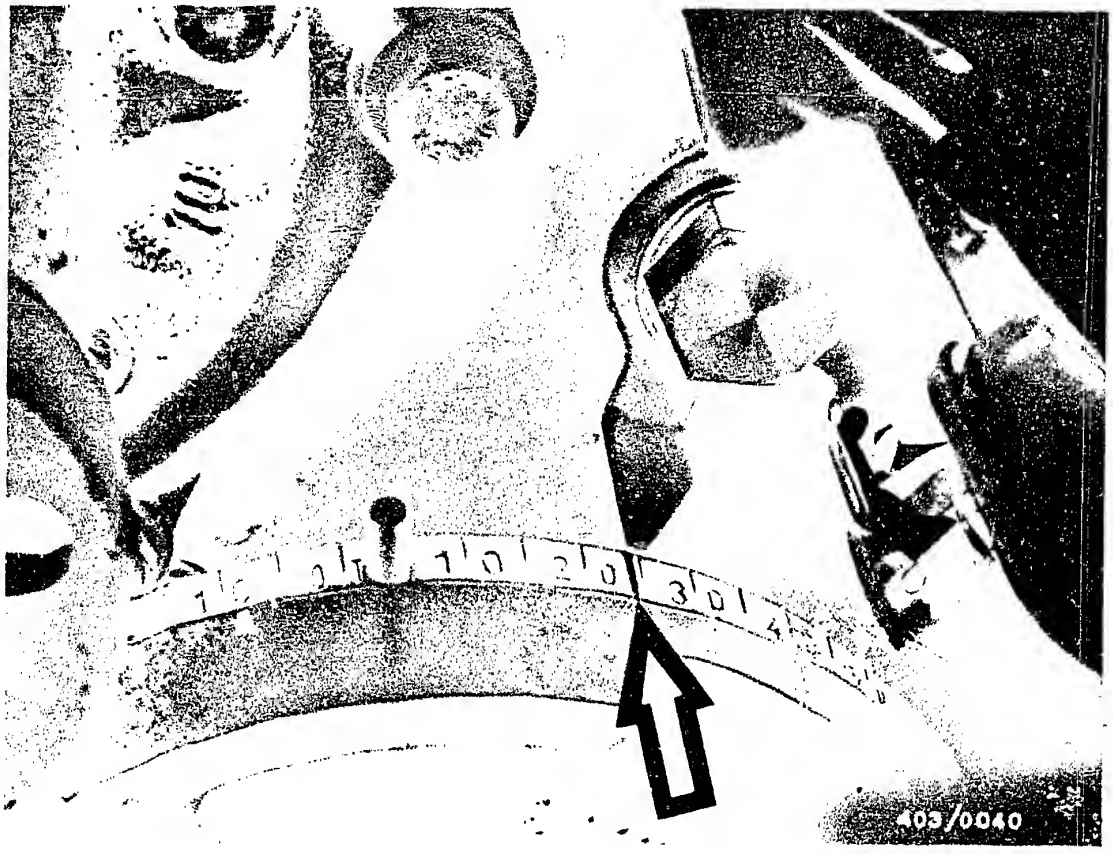
Before installing the fuel-injection pump, check whether the connecting rod (5) is correctly adjusted. To do this, push the regulating lever (1) onto the full-load stop (2). The operating lever (8) must have about 0.5mm play up to the full-load stop on the vacuum-control valve (6).

Adjustment:

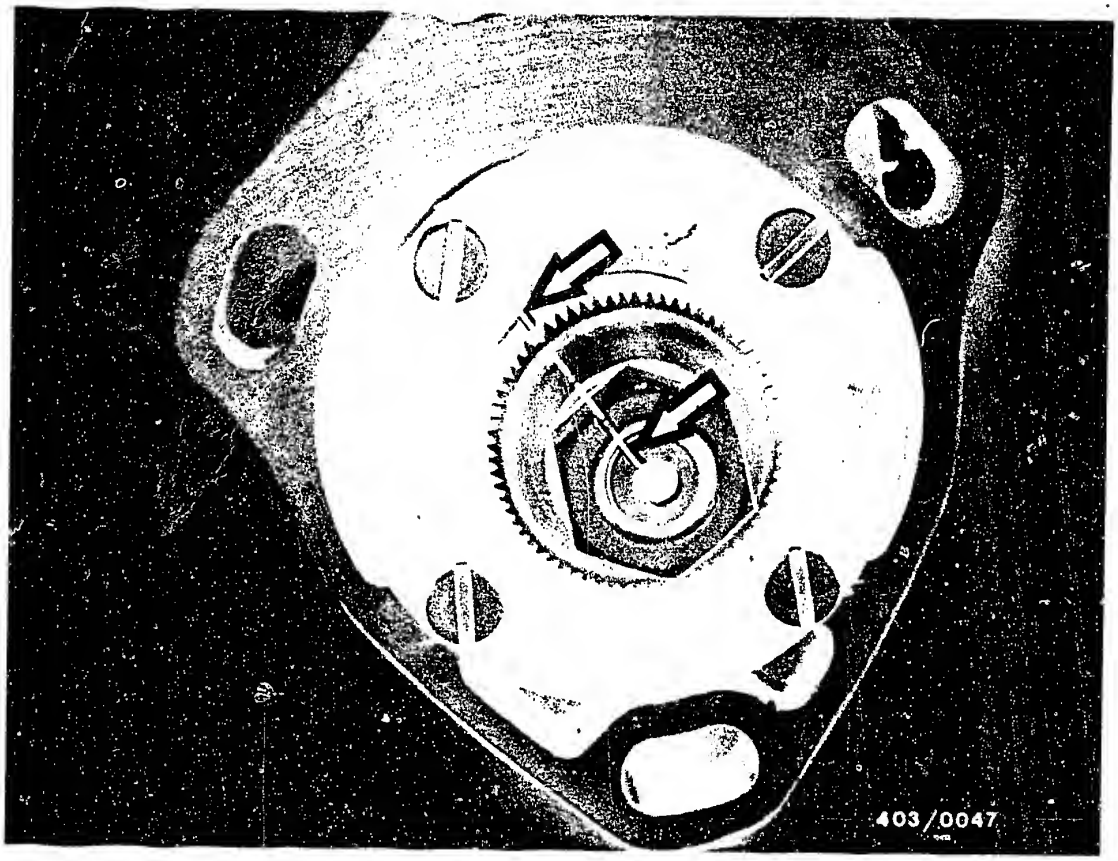
Adjust the connecting rod (5) with adjustable ball head (4).



Remove support bracket (1) from the removed injection pump and screw onto the injection pump being installed. Do not tighten fastening screw (2) so that it is still possible to move along the slot.



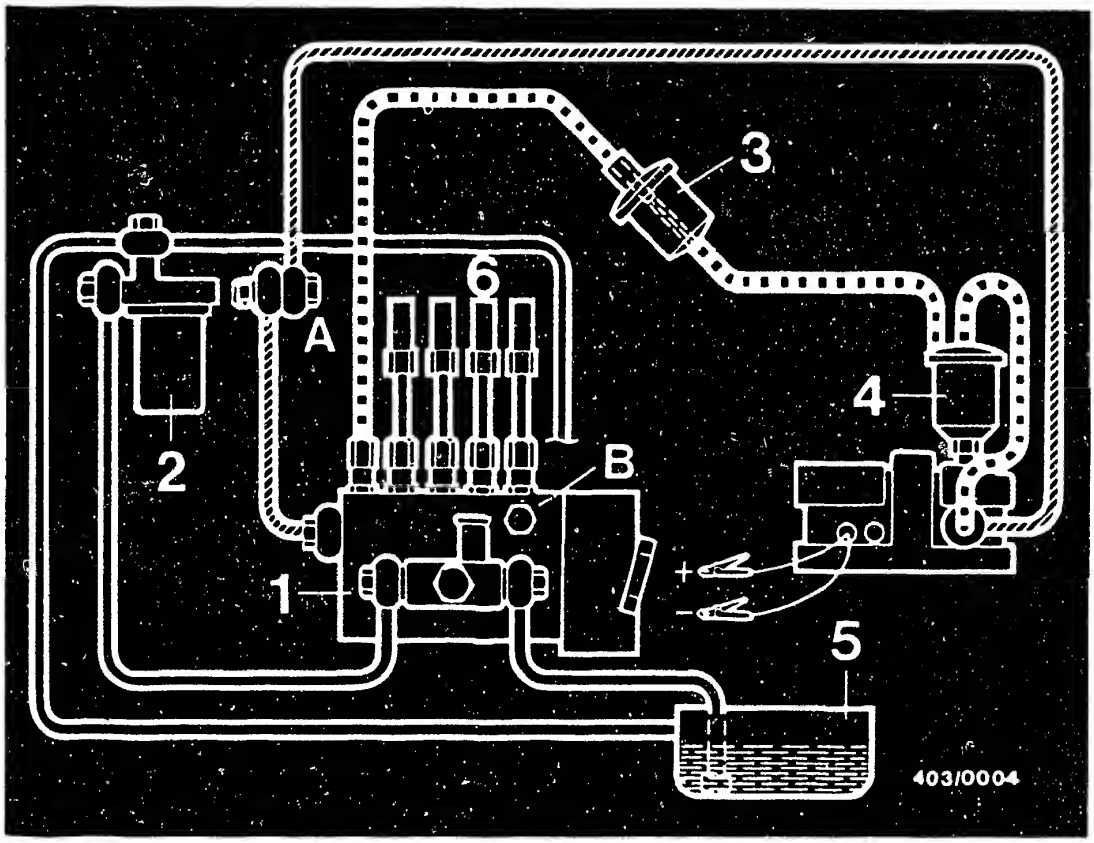
Before moving the injection pump to position, check again whether the piston of cylinder 1 is at 24° before TDC on the compression stroke.



Fit a new gasket.

Set the injection pump to the mark.
To do this, turn the injection-pump camshaft until the mark on the camshaft is in alignment with the mark on the flange (arrows).

Slip coupling sleeve onto driver and move injection pump into position so that the pin holes are in the centre of the slots.
This makes it possible to pivot the injection pump to either side for a fine adjustment.
Fit plain washers and slightly tighten the injection pump with the fastening nuts.



Return line
High pressure approx. 34-2 bar
1 = Injection pump
2 = Fuel filter
3 = Sight glass
4 = Start-of-delivery setting device
5 = Fuel tank
6 = Pressure-relief valves
A = Inlet-union screw, fuel inlet of start-of-delivery setting device
B = Close fuel return line with screw plug.

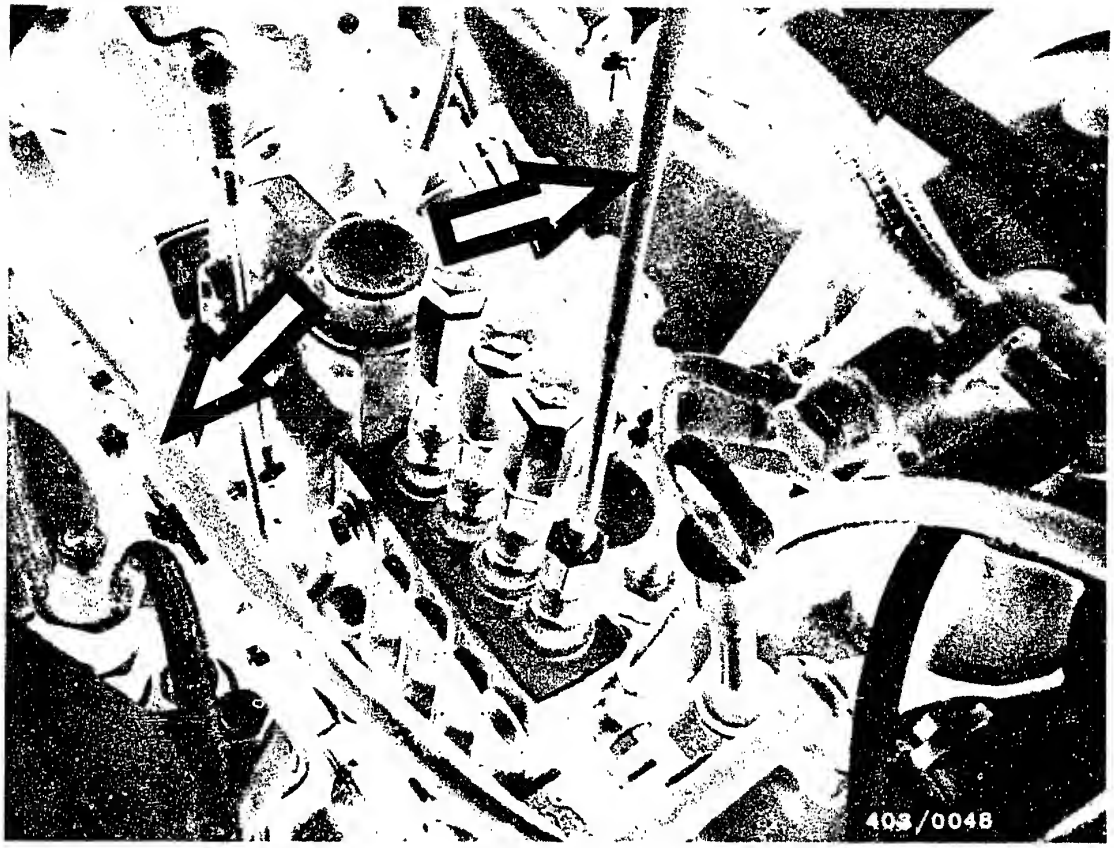
22.3 Connection diagram for setting the start of pump delivery

High-pressure overflow method

22.4 Setting the start of pump delivery

Place the setting device near the vehicle (e.g. workshop trolley).
Connect high-pressure hose of device to suction-gallery inlet of injection pump. Close off suction-gallery return with screw plug.
Screw test line KDEP-P 100/11 onto the referenced outlet of cyl. 1 (for setting the start of delivery) and fit a pipe bend.
Hang the return hose into the fuel tank of the setting device.
Close off the other pump outlets with pressure-relief valves KDEP-P 100/13.
Connect electric cables to vehicle battery (12 V) (red cable to +).
Fill fuel tank of device with diesel fuel. Turn the engine over one full time in its direction of rotation (2 crankshaft revolutions) and set to start-of-delivery mark $24^{o} + 1^{o}$ before TDC on the compression stroke.
Switch on the start-of-delivery setting device.
Pivot the injection pump against the direction of pump rotation as far as it will go.

Caution
While measuring, press the injection-pump regulating lever to full load.

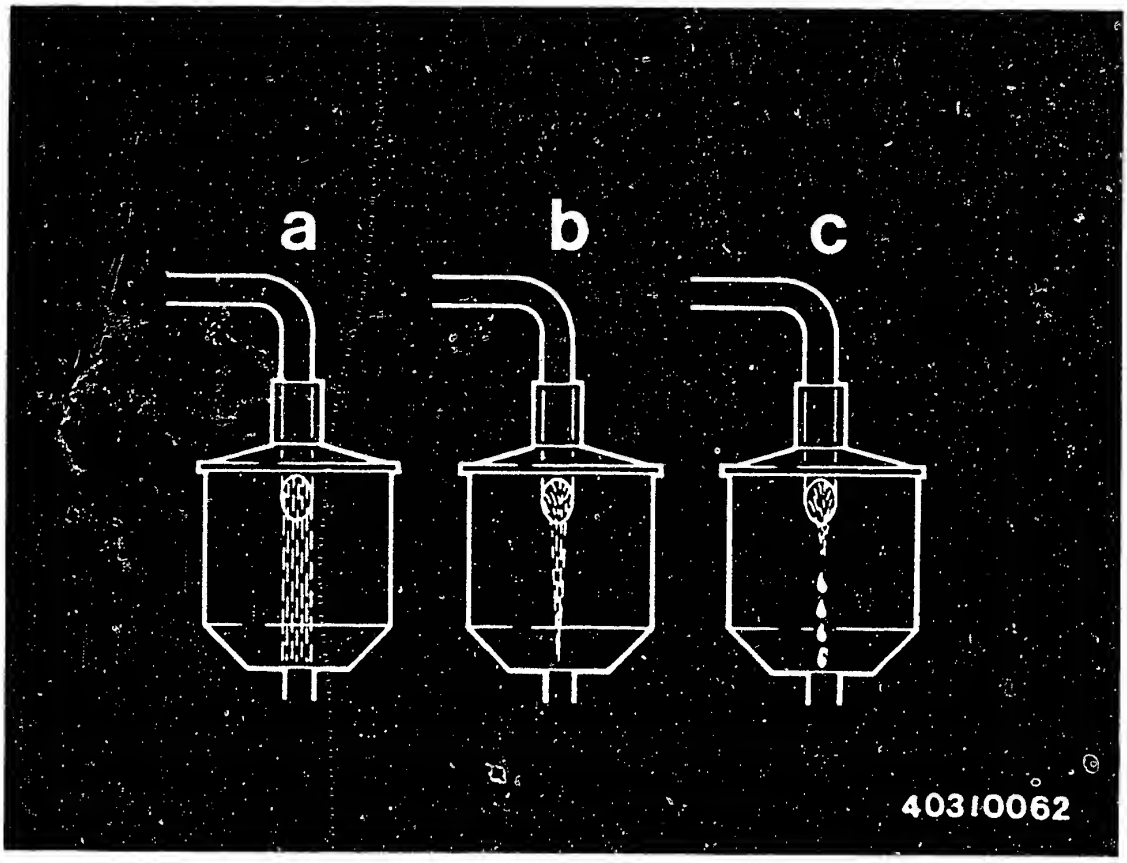


Then pivot the injection pump in the direction of rotation of the pump until the jet of fluid changes to a chain of drops.

Pivoting the injection pump

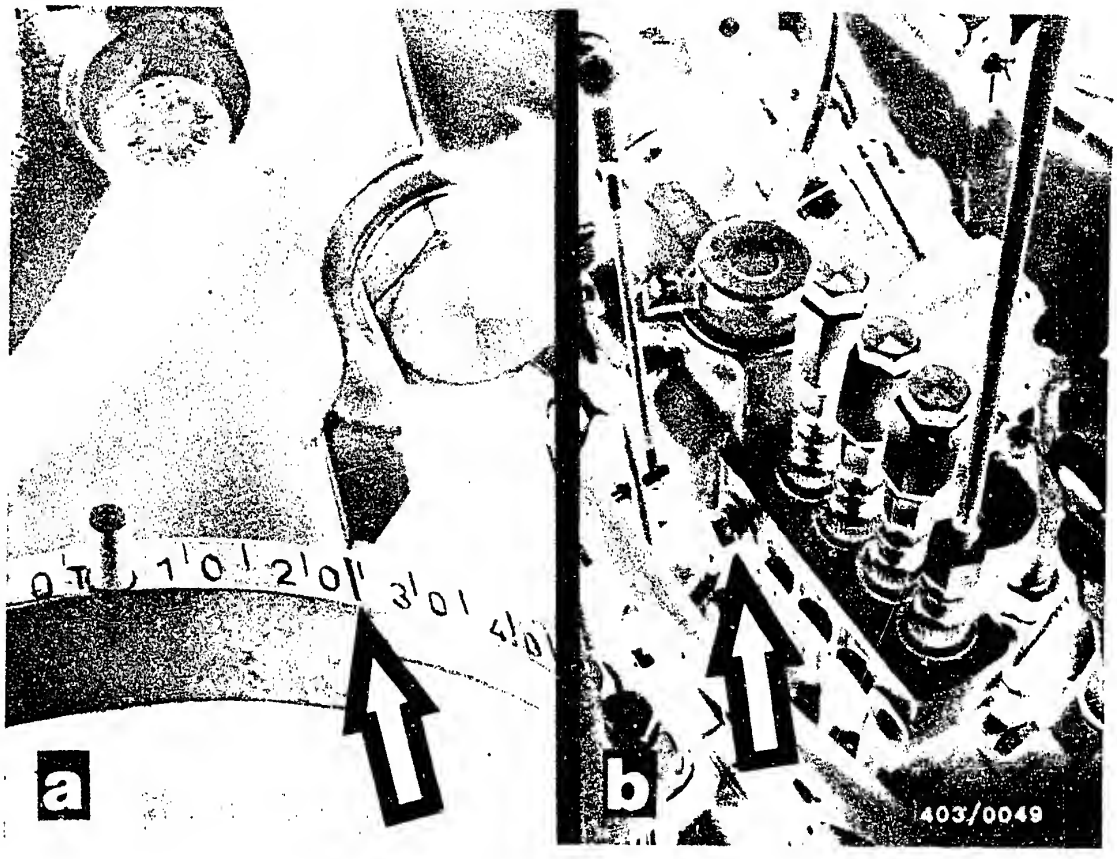
toward the engine = Earlier start of delivery
away from engine = Later start of delivery

If there is not sufficient room for adjustment, the injection pump must be moved.
Repeat the check of start of pump delivery.
Tighten injection-pump fastening screws.
Switch off the start-of-delivery setting device.



a = Full jet of fuel
b = Jet of fuel tapers off - shortly before start of delivery
c = Chain of drops - start of delivery

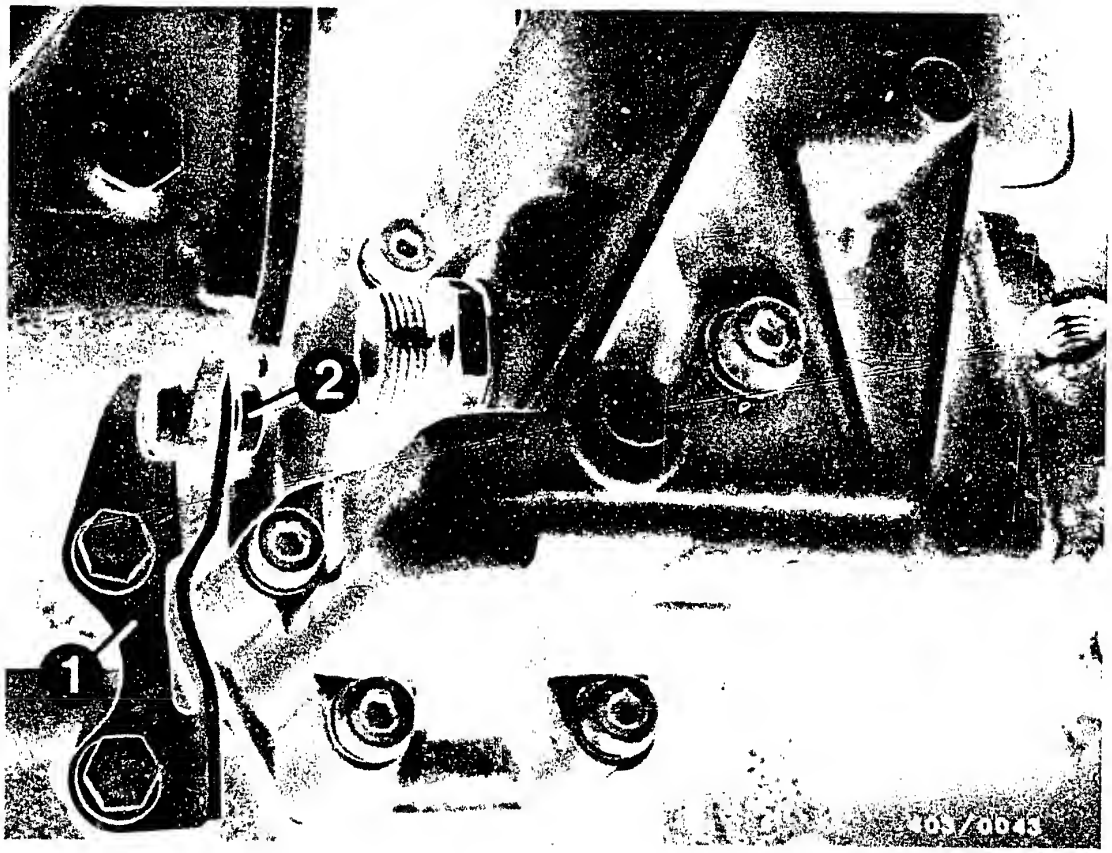
Repeat the check of start of pump delivery.
Turn over the engine in its direction of rotation until shortly before start of delivery.
Switch on the start-of-delivery setting device.
Set engine to start-of-delivery marks, while at the same time observing the jet of fuel at the pipe bend of the injection pump. The start of delivery is reached when the jet changes into a chain of drops.



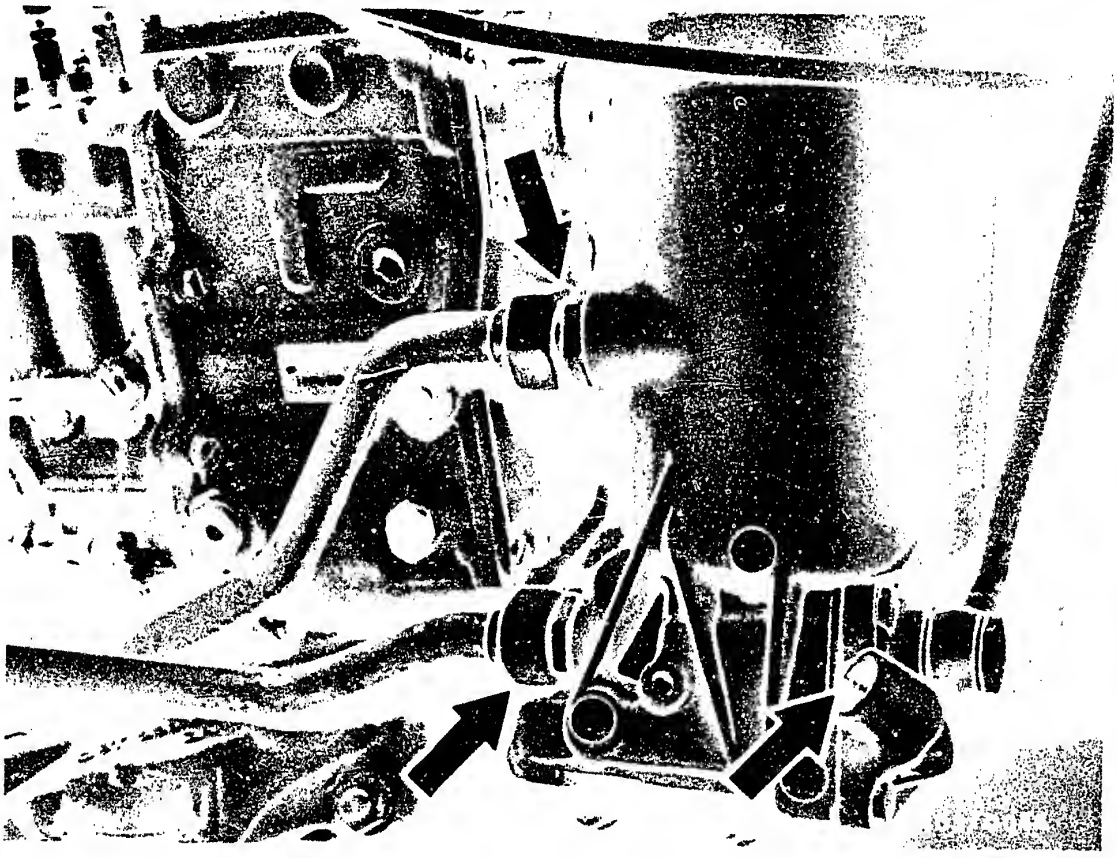
In this position marks on the engine for start of delivery must be in alignment (Fig. a). Nominal value $24^{0} \pm 1^{0}$ before TDC.
Switch off the setting device and remove with accessories.

Remove screw plug (arrow) from injection-pump return and connect return line (Fig. b).

Fit fuel-injection tubing on injection pump.

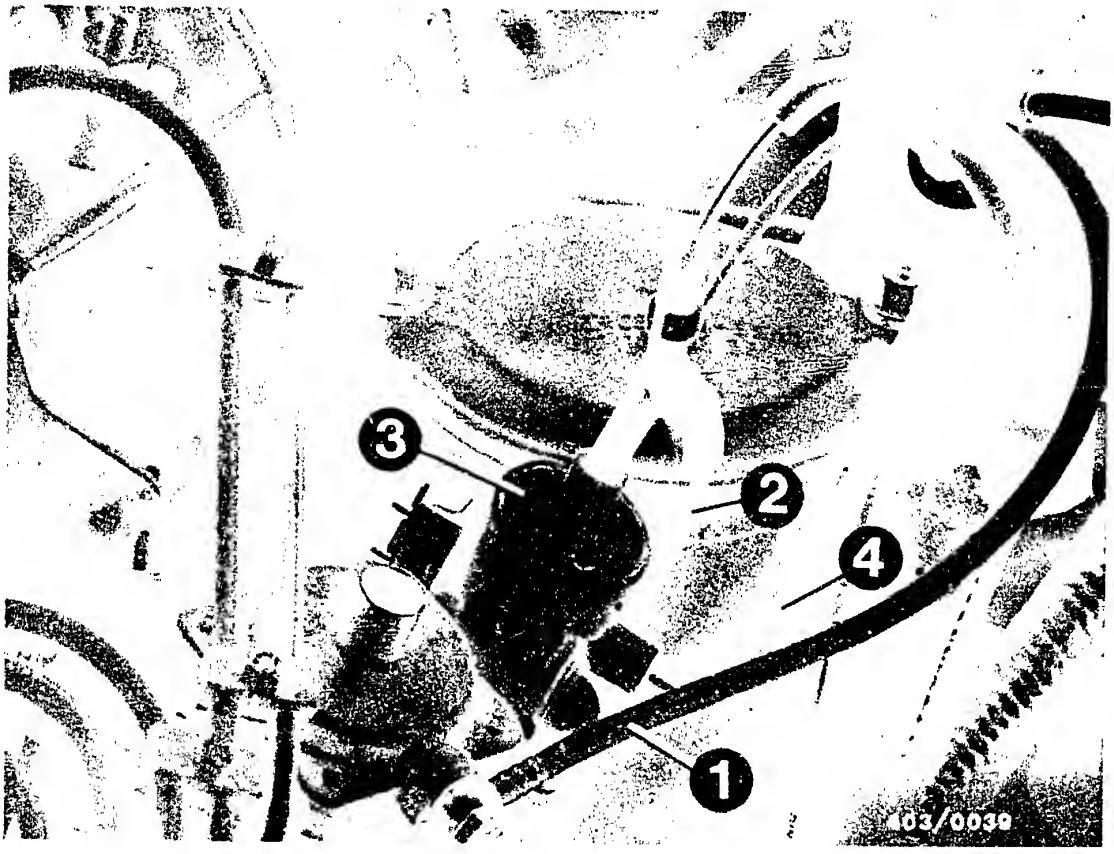


Tighten fastening nuts on injection pump and screw support bracket (1) first of all onto the cylinder block and crankcase.
Then tighten fastening screw (2) in the slot of the support bracket.
For fastening the support bracket, use only shim rings Part No. 116 990 1440, and hexagon screws M8x16.
Screw lubricating-oil line onto injection pump.



Fit oil filter and oil-filter cover with new seal.

Connect all oil lines to oil filter.



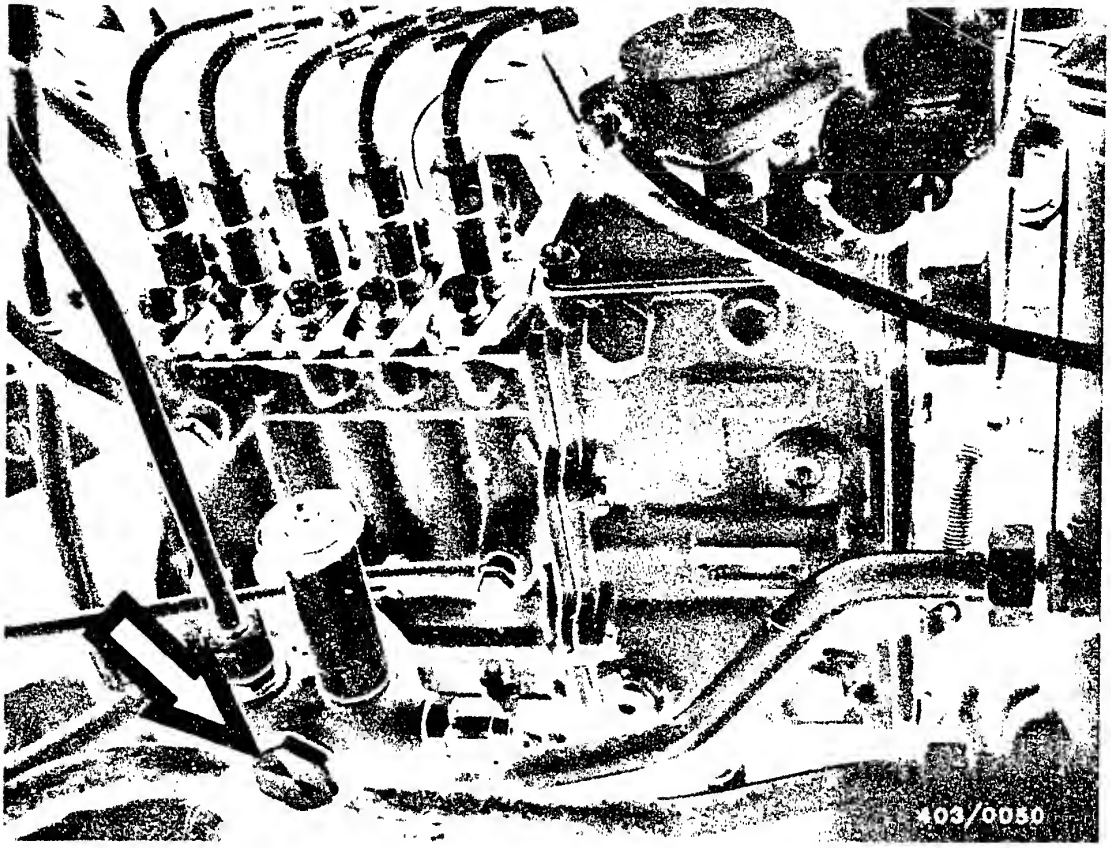
Plug on cable for temperature sensor (4).
Connect charge-air pressure line (1) and vacuum line (2) to the injection pump as well as all fuel lines.

Bleed the injection system with the hand primer.

Check the engine control and adjust.

Bring the engine to operating temperature and check all connections for leaks.

Check and adjust engine idling.

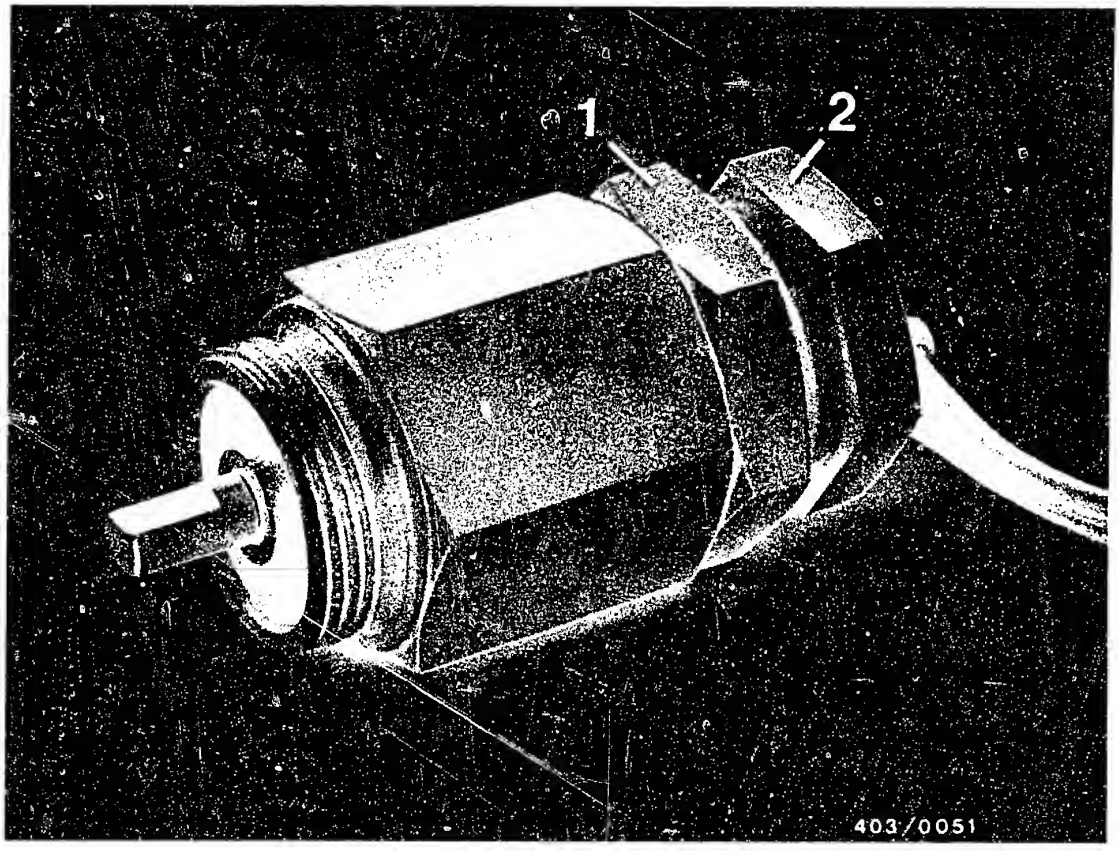


23. Testing the operation of the timing device

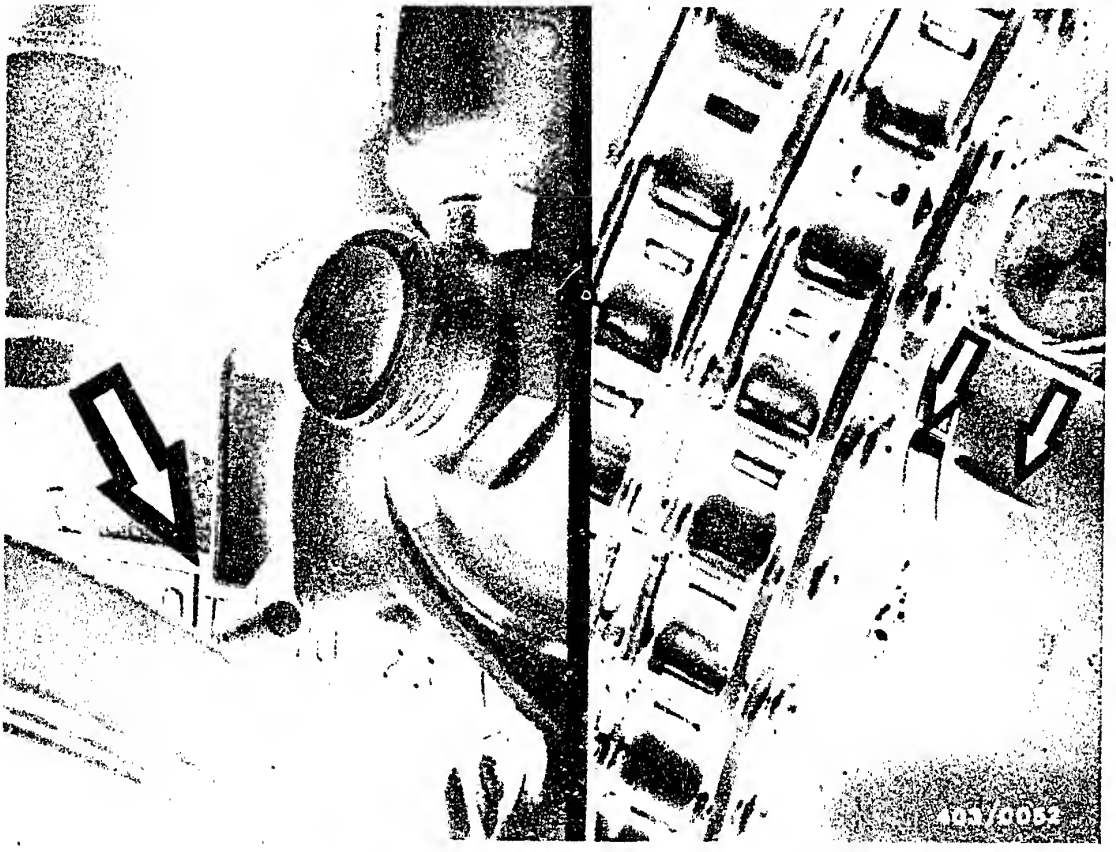
The operation of the timing device is tested with pickup 1 687 224 556 and contact-triggered stroboscope 0 681 101 104.

Mount the pickup on the supply pump.

To do this, unscrew the screw plug (arrow) of the supply pump.



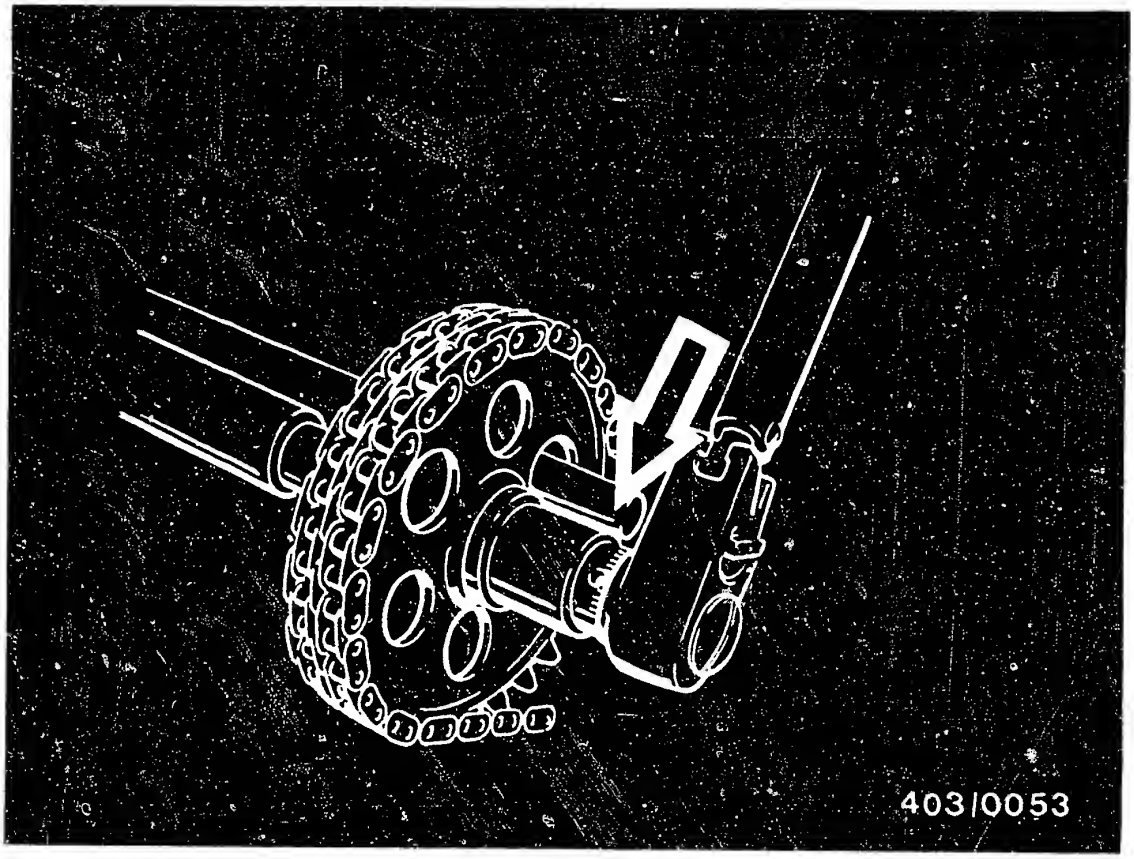
Loosen lock nut (1) on pickup and screw back the guide-part (2).
Screw the pickup into the supply-pump housing.
Connect the contact-triggered stroboscope.
Drive the engine and screw in the guide-part of the pick-up until the contact-triggered stroboscope flashes regularly.
Tighten the lock nut.
Increase the engine speed, while at the same time directing the flash of the contact-triggered stroboscope at the graduated disc (flywheel on engine). The timing advance in degrees must take place quickly and smoothly.
If no timing advance can be seen, remove the timing device.



24. Testing and adjusting the engine timing

24.1 Testing the engine timing

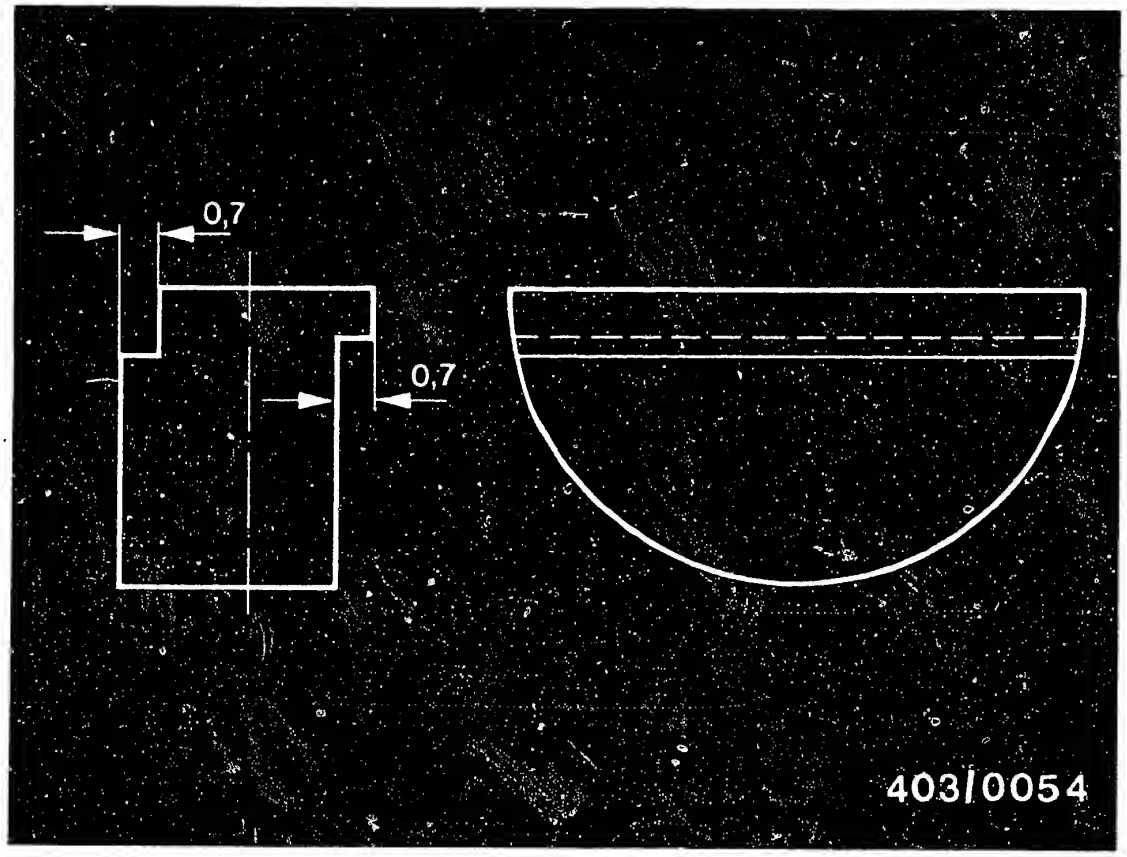
Unhook the engine control.
Remove the cylinder head cover.
Turn the crankshaft in the direction of rotation of the engine until cylinder 1 is at the TDC mark (Fig. a).
The marks on the shim and the reference point on the 1st camshaft bearing must be in alignment (Fig. b).
If the marks are not in alignment, the engine timing must be adjusted.



24.2 Adjusting the engine timing

Loosen the anti-fatigue bolt for fastening the camshaft gear, but do not unscrew.
In order to loosen the camshaft gear, apply counter-force with an auxiliary tool (arrow).

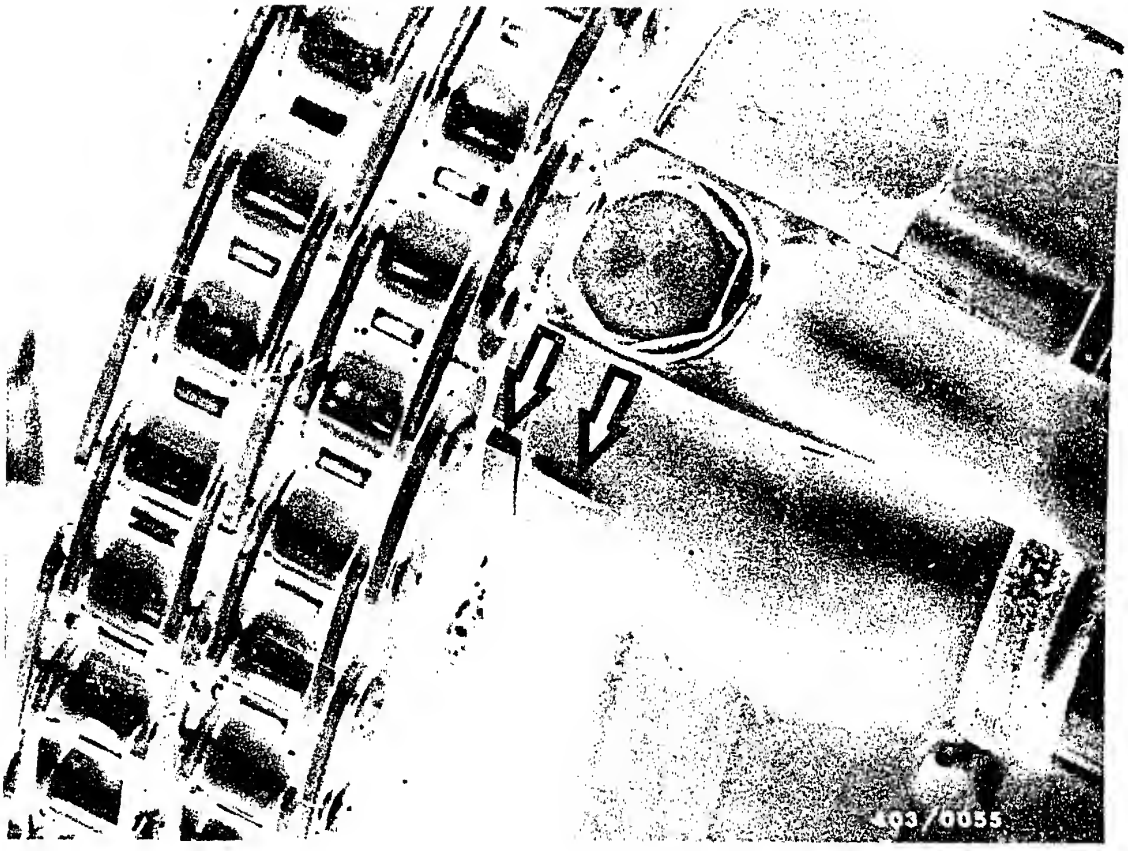
Remove the camshaft gear.



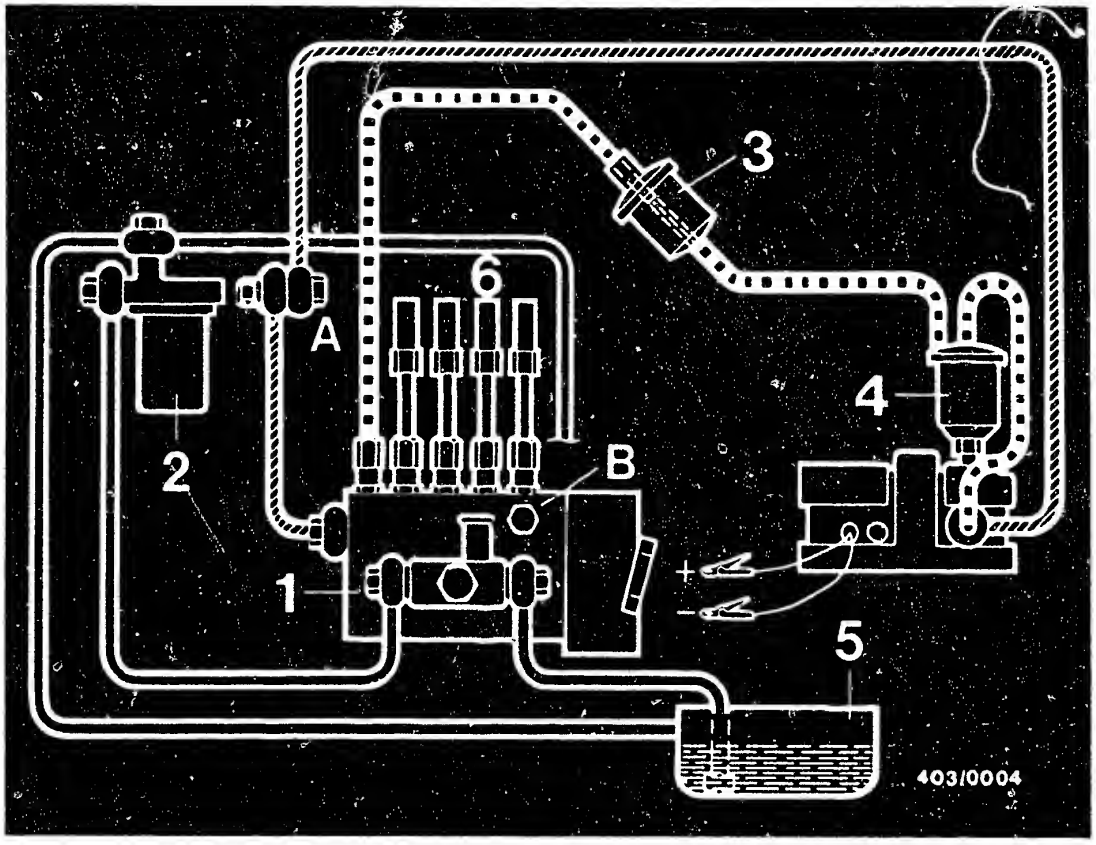
Adjust the engine timing by changing the Woodruff keys (DB service part).
Graduations of Woodruff keys.

Crank angle	mm
4^{o}	0.7
6.5^{o}	0.9
8.0^{o}	1.1
10.0^{o}	1.3

(example shown in illustration)



Slip camshaft with chain in position onto the camshaft.
Make sure that the mark on the shim is in alignment with the reference mark of the first camshaft bearing (arrow).
Tighten camshaft gear to 80 Nm.
Mount the cylinder head cover.
Adjust the engine control.



Return line

High-pressure approx. 34-2 bar

1 = Injection pump
2 = Fuel filter
3 = Sight glass
4 = Start-of-delivery setting device
5 = Fuel tank
6 = Pressure-relief valves

A = Inlet-union screw, fuel inlet of start-of-delivery setting device
B = Close fuel return line with screw plug

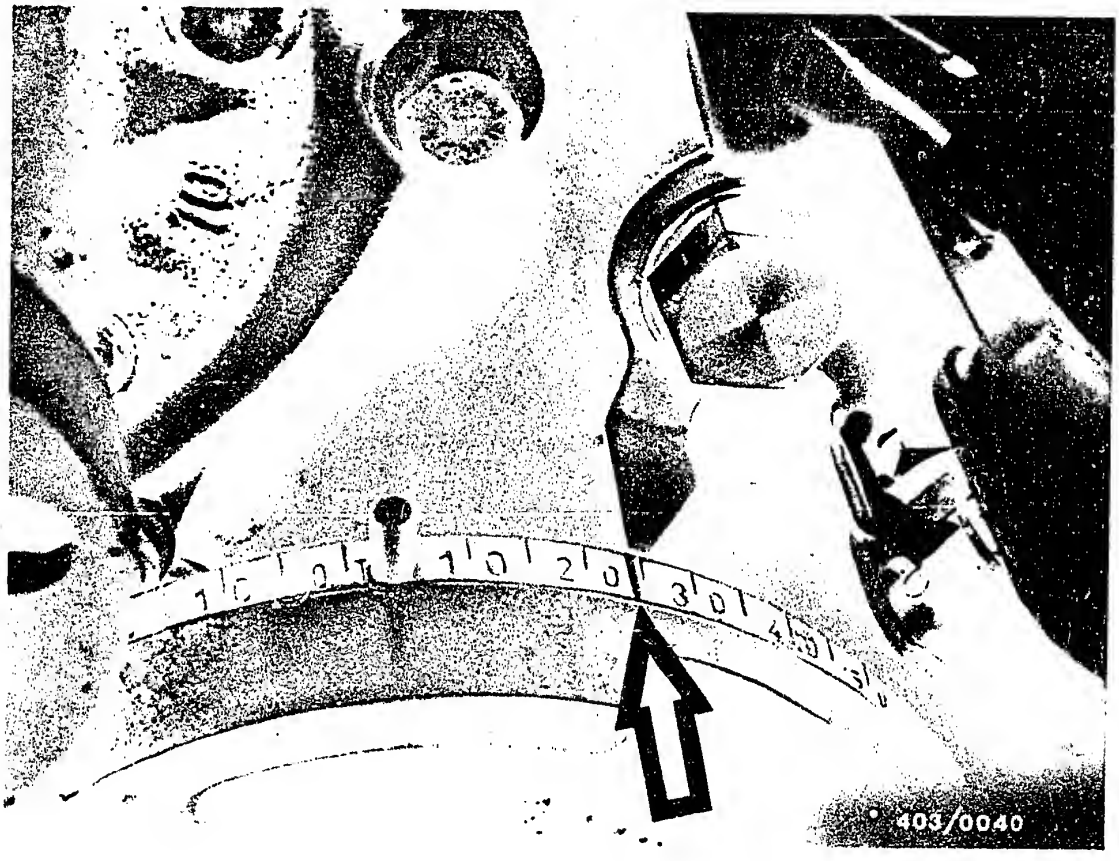
25. Injection timing

Connection diagram for setting the start of pump delivery
High-pressure overflow method

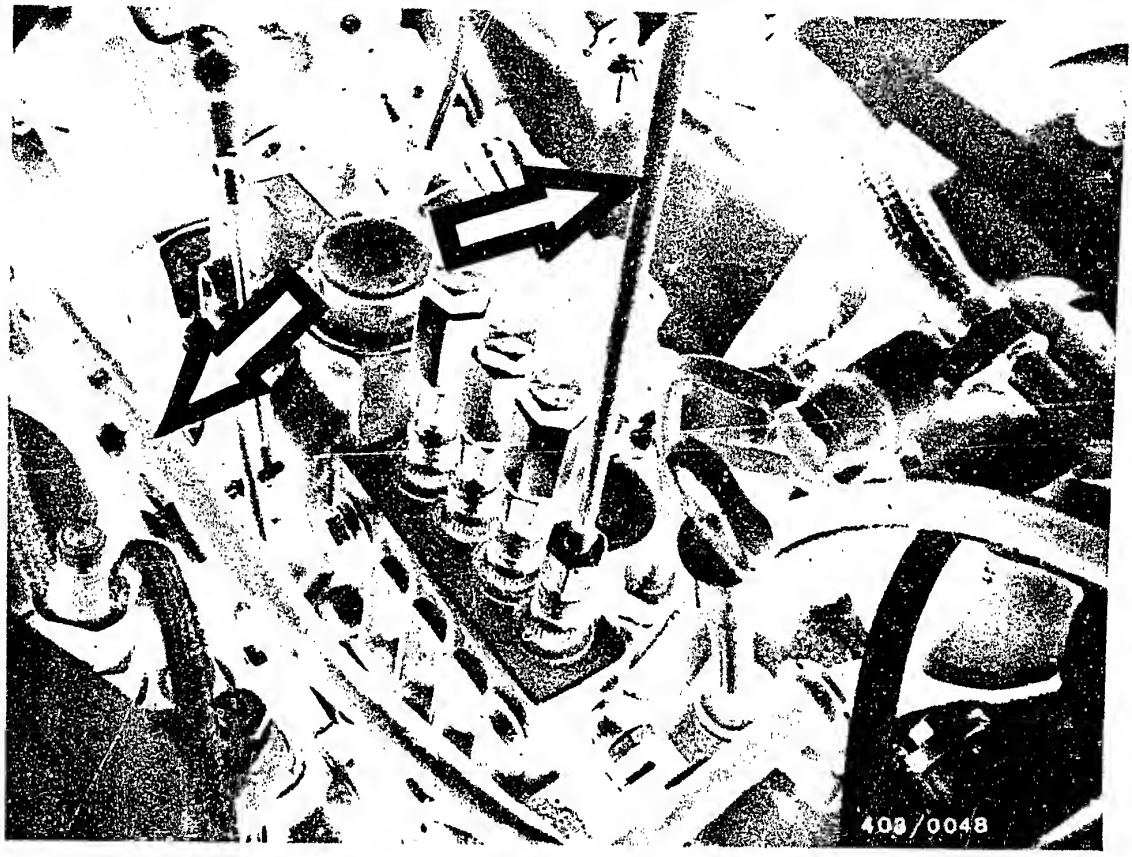
Remove fuel-injection tubing from injection pump and nozzle holders.
Place the setting device near the vehicle (e.g. workshop trolley).
Connect the high-pressure hose of the start-of-delivery setting device to the suction-gallery inlet of the injection pump. Seal off the suction-gallery return with a screw plug.
Screw the test line KDEP-P 100/11 on the referenced outlet of cyl. 1 (for setting the start of delivery) and fit a pipe bend.
Hang the return hose into the fuel tank of the setting device.
The other pump outlets are sealed with the pressure-relief valves KDEP-P 100/13.
Connect the electric cables to the vehicle battery (12 V) (red cable to +).
Fill the fuel tank of the start-of-delivery setting device with diesel fuel.
Turn the engine over a complete turn in the direction of rotation of the engine until shortly before the start of delivery.
Switch on the start-of-delivery setting device.

Caution:

While measuring, press the regulating lever of the injection pump to "full load" and remove the vacuum hose from the vacuum unit.



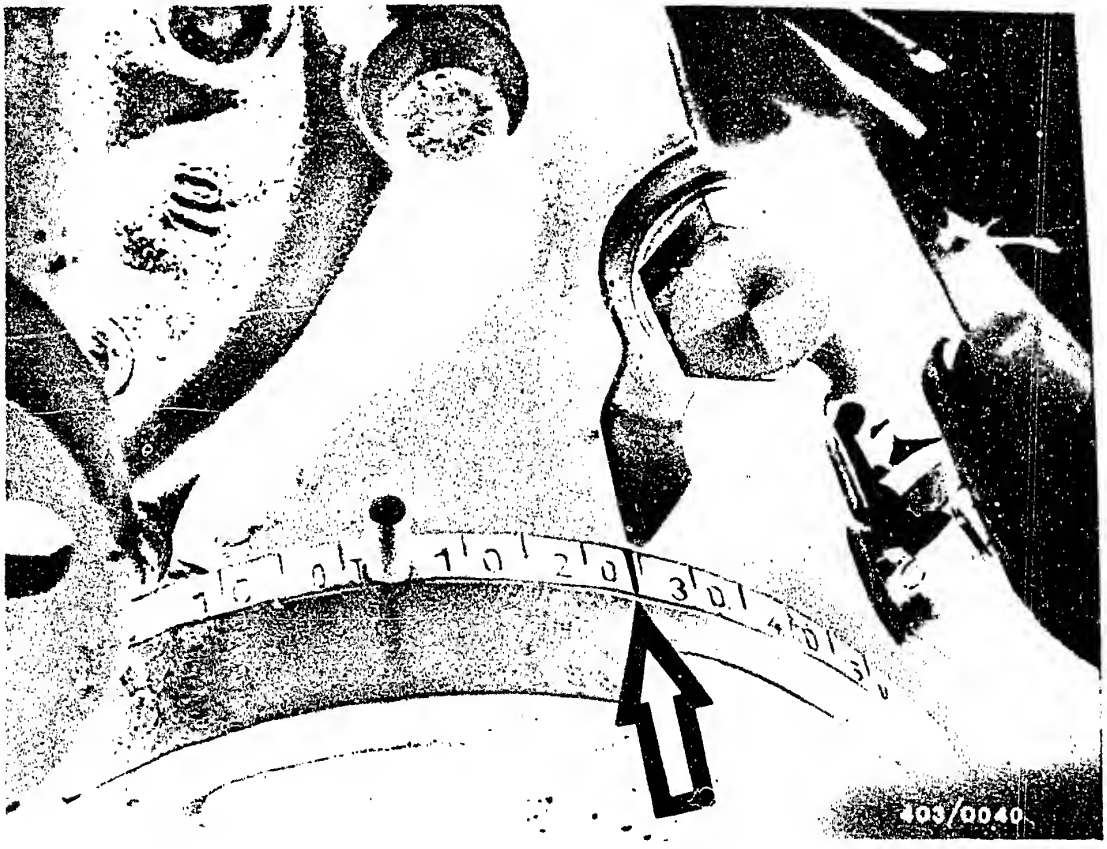
Turn the engine over in its direction of rotation until the jet of fuel at the pipe bend (referenced outlet) changes into a chain of drops.
In this position, check the markings on crankshaft and flywheel.
If the engine markings are not in alignment, it is necessary to make an adjustment.
Proceed as follows:
Turn the engine over one full turn in its direction of rotation (2 crankshaft revolutions) and set to start-of-delivery mark $24^{o} \pm 1^{o}$ before TDC on the compression stroke.



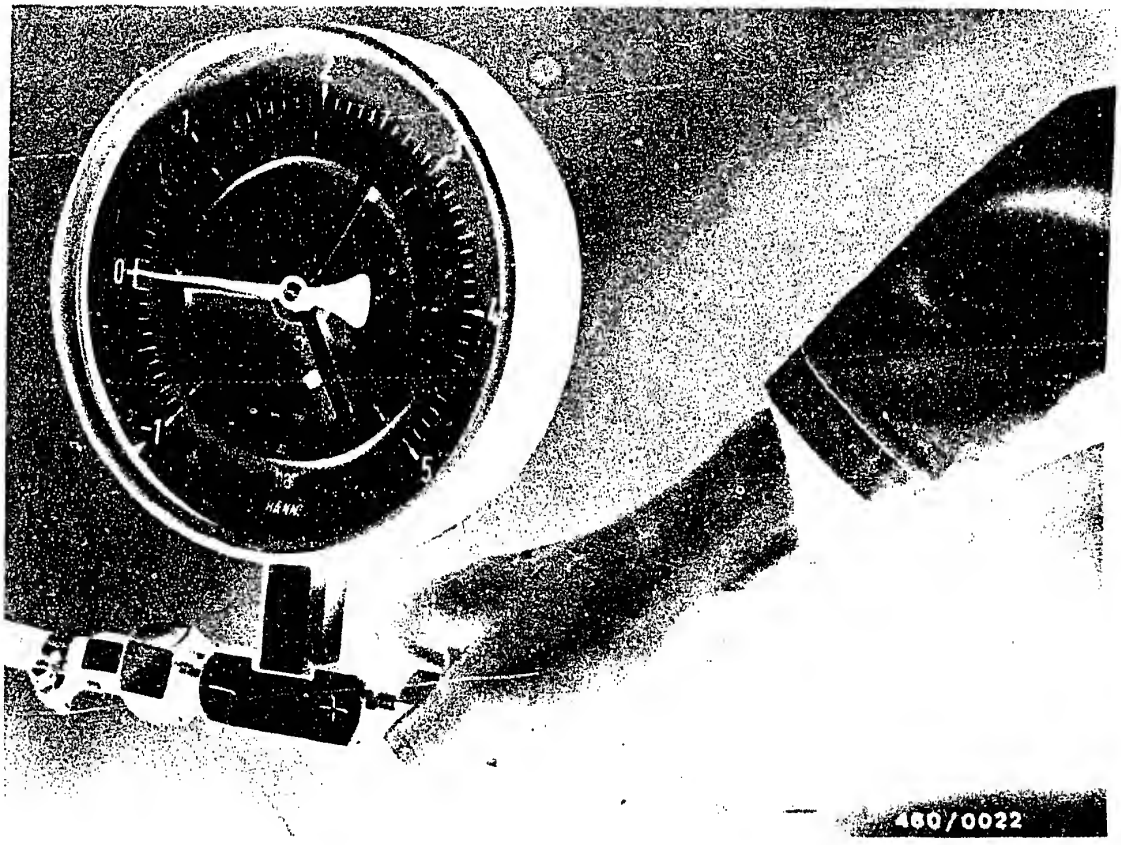
Loosen the injection-pump fastening screws.
Switch on the start-of-delivery setting device.
Pivot the injection pump against its direction of rotation as far as it will go.
Then pivot the injection pump in its direction of rotation until the jet of fuel changes into a chain of drops.
Pivoting the pump
toward the engine = Earlier start of delivery
away from engine = Later start of delivery

If there is not sufficient room for adjustment, the injection pump must be moved.

Repeat the check of the start of delivery.



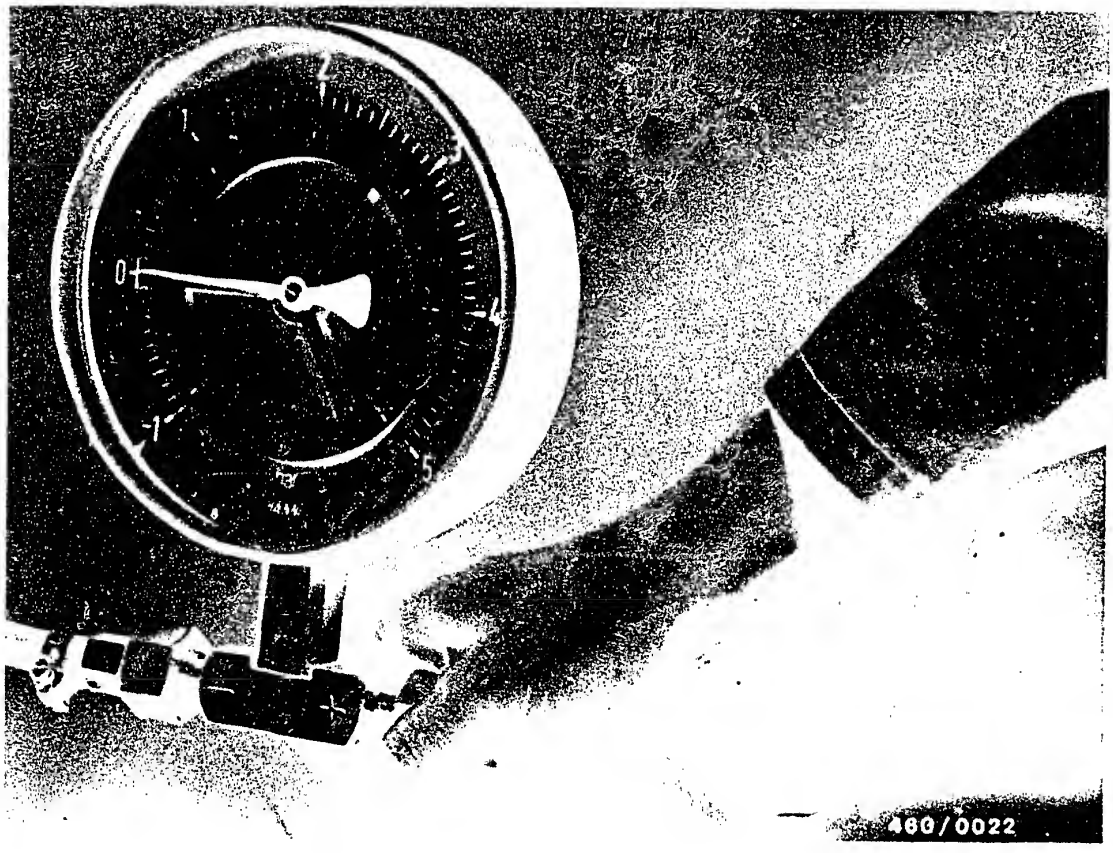
Turn the engine in its direction of rotation until shortly before start of delivery.
Switch on the start-of-delivery setting device.
Set the engine to the start-of-delivery mark, while at the same time observing the jet of fuel at the pipe bend of the injection pump.
The start of delivery is reached when the jet of fuel changes into a chain of drops.
In this position, the engine markings for the start of delivery must be in alignment.
Switch off the setting device and remove the accessories.
Remove screw plug from injection-pump return and connect return line.
Fit fuel-injection tubing to injection pump.



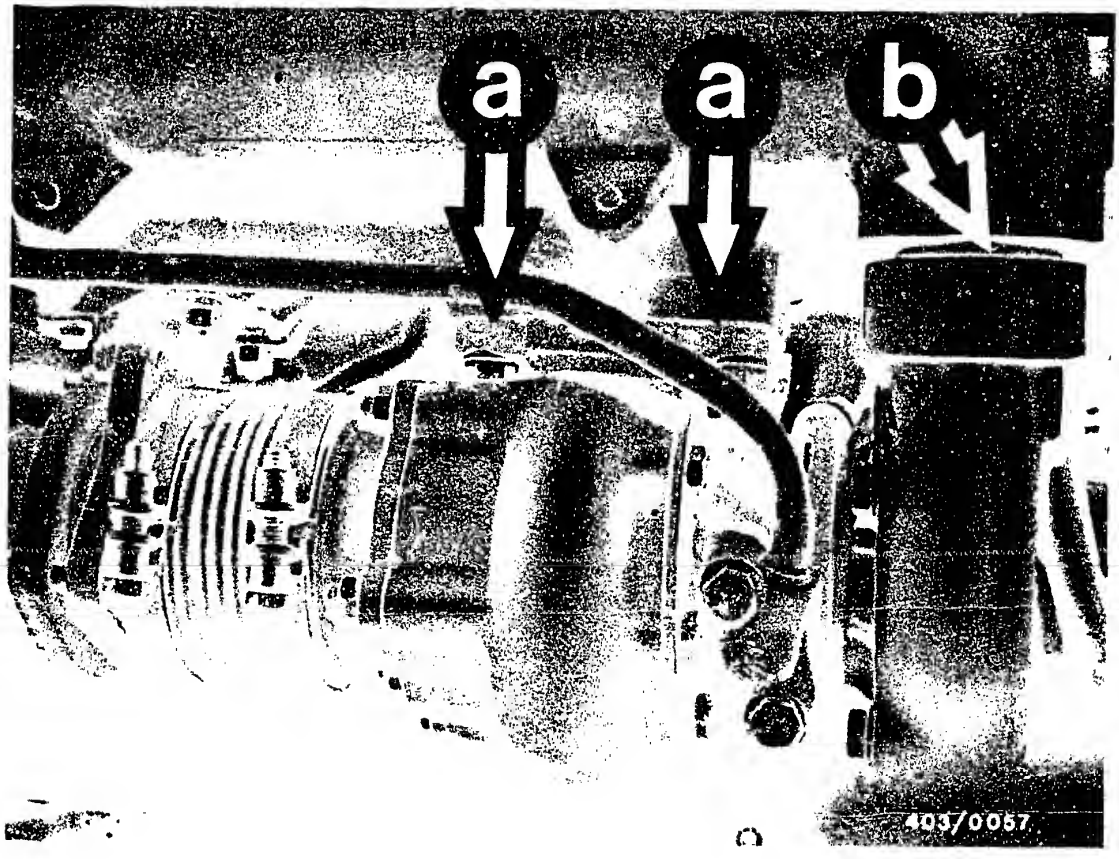
26. Checking the charge-air pressure

The differential-pressure gauge can be used for testing. Connect the + side of the differential-pressure gauge to the charge-air tube (use suitable fittings). Test connection thread M 10 x 1.

Note
In order to assess the exhaust turbo-supercharger, it is essential that the full-throttle control, maximum no-load engine speed, start of pump delivery, injection pressure of injection nozzles as well as the mechanical condition of the engine are O.K.



The charge-air pressure test can only be performed on a chassis dynamometer.
Drive the vehicle on the chassis dynamometer with the selector lever in position "S" at full load and n = 4000 min^{-1}.
The specified charge-air pressure of 0.7-0.8 bar gauge pressure must be reached.



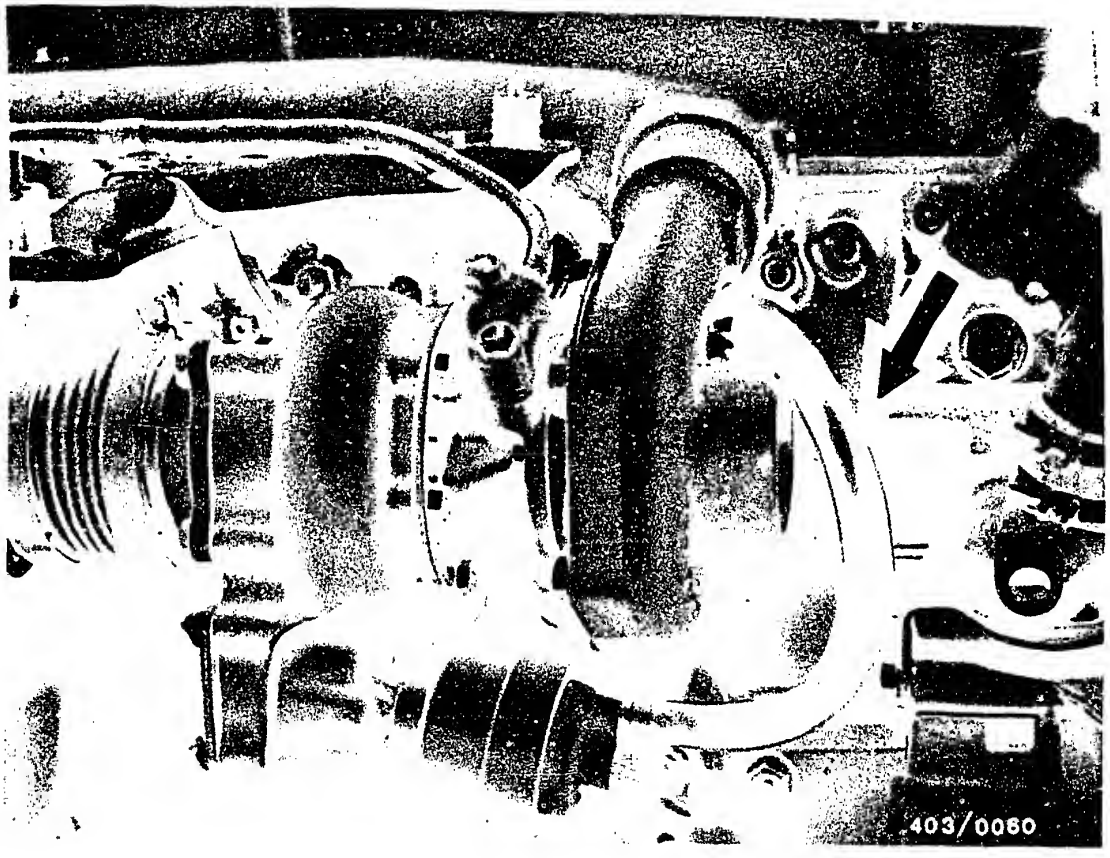
26.1 Testing the exhaust turbo supercharger for leaks

If the charge-air pressure is too low, carry out the following work:

Clean the air filter and check the air-intake dome for throughflow.

Check the exhaust turbo-supercharger for leaks. There may be a leak at the following points:

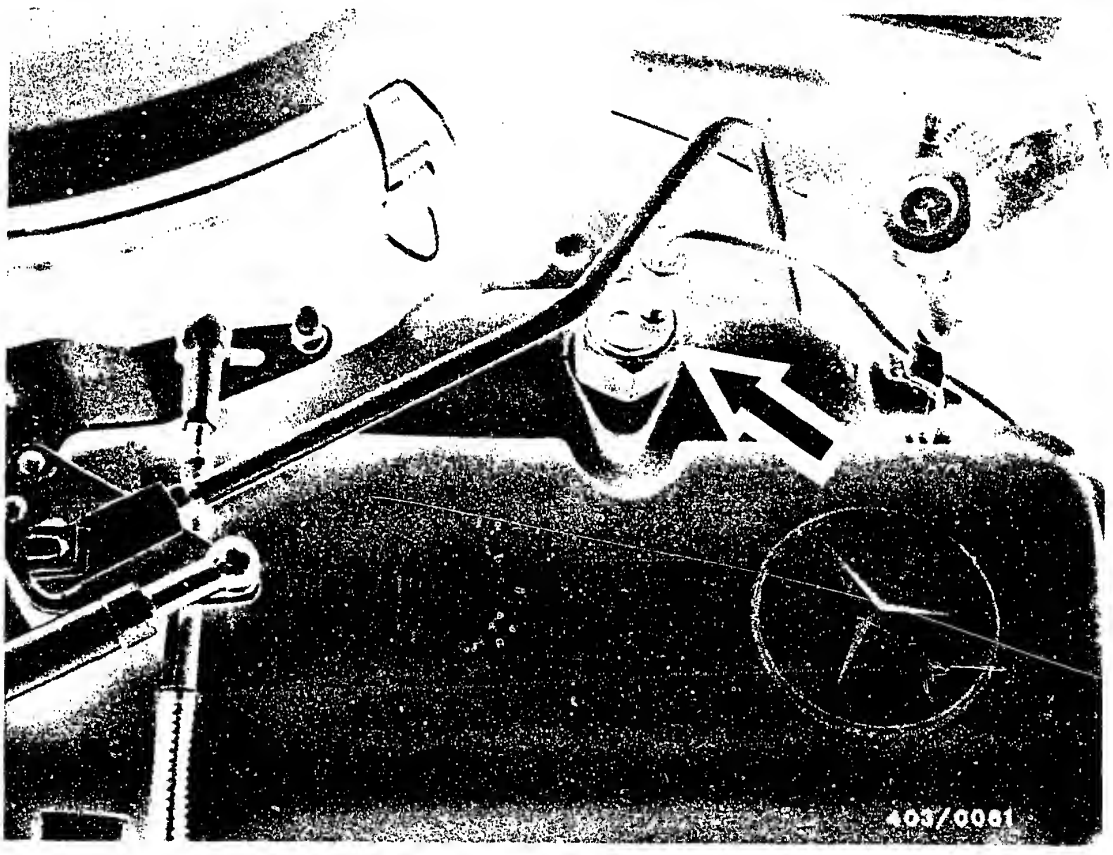
- Flange seal between exhaust manifold and turbine inlet (a).
- Seal between compressor outlet and charge-air tube (b).
- Gasket between charge-air tube and exhaust manifold (not visible in picture).
- Pressure line from charge-air tube to ALDA box (not visible in picture).



Test the charge-air pressure. Nominal value: 0.7-0.8 bar gauge pressure. If the charge-air pressure at full load is above 1.1 + 0.15 bar gauge pressure, carry out the following work:

- Check the connecting hose from the compressor casing to the wastegate (arrow).
  Replace the connecting hose if leaking or kinked.

- If the connecting hose is O.K. and the wastegate is not opening, replace the exhaust turbo-supercharger.



26.2 Testing the pressure switch

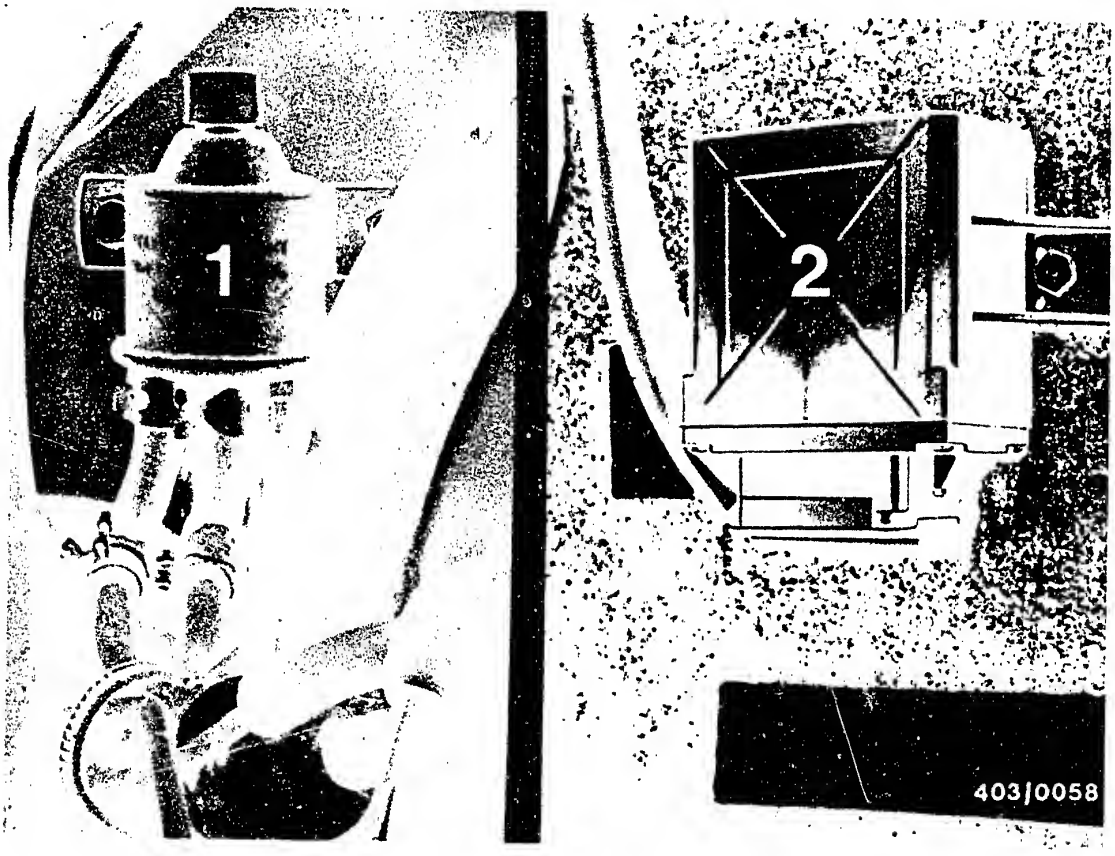
Pressure switch (arrow) on charge-air tube defective:

Remove the electric terminal from the pressure switch.

Drive the vehicle on the chassis dynamometer or on the road.

If the engine no longer misses (shakes), replace the pressure switch.

If the engine still misses, test the change-over valve.

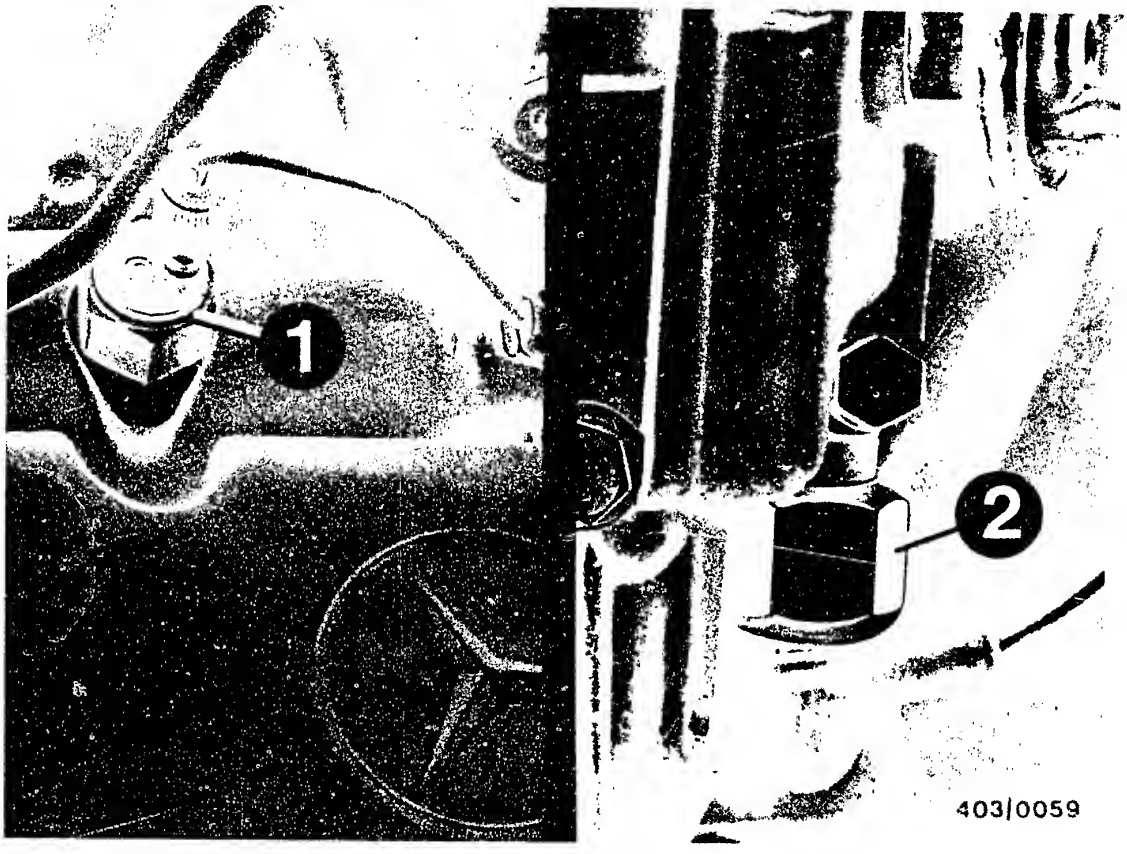


26.3 Testing the change-over valve

Turn the ignition key to position "2". Remove the plug connector from the change-over valve. Check whether the black/red lead is connected to positive. If not, check fuse no. 4 or check the lead for an open circuit.

Below 1.1 + 0.15 bar gauge pressure in the charge-air tube the other brown/black lead must not be connected to negative.
If it is connected to negative, remove the plug connector from the overload protection trigger box (2) and repeat the test.

The overload protection trigger box is installed under the steering column (only up until August 1981).



If there is still a negative connection, the fault may lie with the pressure switch (1) (1.1 ± 0.15 bar gauge pressure) or with the lead.
If, after removing the plug connector from the trigger box, there is no negative connection, the fault may lie with the overload protection trigger box or with the transmission pressure switch (0.3 bar gauge pressure). The transmission pressure switch is located on the transmission housing near the speedometer shaft.

After-sales Service

Motor Vehicle Service Information

MERCEDES-BENZ 240 D, 300 D

VDT-I-MB 036 En
Ed. 2, 8.1981
Replaces Ed. 1, 11.1980

Engine shake during idle

Correction

Complaints are being received regarding engine shake during idle on the above vehicles.

These complaints can be due to idle-delivery scatter between the different pump cylinders together with engine-specific tolerances.

In part, the engine shake can be reduced by lowering the idle-delivery scatter to 0.5 cm³/1000 strokes.

This special adjustment is to be charged to the customer.

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After-sales Service

Motor Vehicle Service Information

MERCEDES-BENZ 300 TD-TURBO

VDI-I-MB 041 En

7.1983

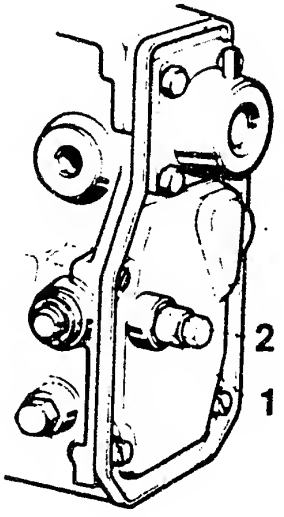
Engine shake in the lower idle-speed range

Fuel-injection pumps PES 5MW.., 0 403 245 014
0 403 245 016

Occasional complaints are being received with the above-named vehicle about engine shake in the lower idle-speed range. It is only in such cases that the damper on the fuel-injection pump is to be readjusted.
The in-line injection pumps type MW with the centrifugal governor MW 28-1 and MW 29 are equipped with dampers (friction brake).

The damper is comprised of a setting screw and a locking nut and is located in the governor cover (see Fig.). By forcing the setting screw up against the driver (reverse-transfer lever of the sliding sleeve and the variable-fulcrum lever) the damper prevents engine shake in the lower idle-speed range.

Setting: Bring the engine to operating temperature. Loosen the locking nut (1). At idle speed (750 ± 100 min^{-1}), screw the setting screw (2) in until the shaking stops. Do not screw in beyond this point. Finally, tighten the locking nut (1) with a torque of 20-25 Nm.



Note: Only screw the damper in this far because otherwise the idling characteristic of the cold engine will be adversely affected. When repairing the pump, do not set the screw to contact the driver because the engine shake in question does not occur on every vehicle. Nevertheless, always tighten the locking nut with 20-25 Nm.

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